

ANGERS CATHEDRAL: THE VAULTS OF THE NAVE.*

By JOHN BILSON [F.], F.S.A.

THE nave of Angers Cathedral is certainly one of the masterpieces of mid twelfth-century architecture. This wide aisleless nave, with its simple plan of three great bays, though producing a very different impression from the more complicated plans of the northern cathedrals, shows extraordinary grandeur of conception and boldness of construction.

Its vaults are indeed remarkable.† We may be surprised that the builders of the middle of the twelfth century should have been able to poise three vast ribbed vaults of such perfect construction over a span of more than fifty feet. Their date, however, is unusually well established, for, of Normand de Doué, who was bishop from 1149 to 1153, it is recorded that "voluturas lapideas miro effectu aedificare coepit."‡

They are among the earliest, and are certainly the most important, of the so-called "domical" vaults of the Angevin school. It is of consequence therefore to know what were the precise reasons for their particular form. Most writers on architecture see in them the influence of the domed churches of Aquitaine, of the type of which an example is afforded by the nave of Fontevault,§ on the banks of the Loire itself. Some, more cautious than others, content themselves with saying that the form of the Angevin vaults recalls that of the dome. More frequently, however, a more or less dominant rôle is assigned to the dome in the formation of these vaults; the dome has been considered to be an essential element in their origin and development; they have even been called "ribbed domes."

In view of these different opinions, it had long seemed to me to be very desirable to have an analysis of so important an example as the nave vaults of Angers Cathedral, which would enable us to determine how far the dome had really influenced their construction. The drawings of these vaults which had hitherto been published scarcely gave sufficient information on which to base a complete analysis of their structure. I therefore made use of the opportunity afforded by the *Congrès* of Angers to take, with the obliging collaboration of M. Chauliat, the necessary measurements to make the drawing of the vault of the middle bay of the nave, which is illustrated in fig. 1.|| With the assistance of this drawing, I propose

* This paper was written for the Société française d'archéologie, and has been printed, in the form of a translation by M. le Comte de Lasteyrie, in the volume of the *Congrès archéologique de France tenu à Angers*, 1910, vol. ii. pp. 203-223.

† The view of the interior of the nave here reproduced is from a photograph very kindly lent by M. Eugène Lefèvre-Pontalis, the President of the Société française d'archéologie, and Professor of Archaeology at the Ecole des Chartes.

‡ Marchegay, *Chroniques des églises d'Anjou*, p. 192. Cf. Chanoine Urseau, in the volume of the *Congrès d'Angers*, vol. i. pp. 164 and 174. Normand de Doué was bishop from 6th March 1149 to 27th April 1153.

§ For longitudinal section of the nave of Fontevault, see the volume of the *Congrès d'Angers*, vol. i. p. 52.

|| Third Series, Vol. XIX. No. 20.—19 October 1912.

|| As it would be impossible to take complete measurements of a vault of this kind without extensive scaffolding, it may be well to state precisely what dimensions have been taken for fig. 1. The measurement of the plan was of course a simple matter. The heights to the capitals of the pillars and to the crowns of the wall-arches were measured from the floor. The height of the key of the diagonal ribs was measured through a hole in the cell to the floor. M. Jean Hardion, architecte-en-chef des monuments historiques de Maine-et-Loire, very kindly measured for me a section along the crown of the vault, and from this the height of the crown of the transverse arch was obtained. From the plan and from these heights, the curves of the arches have been developed. I wish to express my sincere thanks to M. Chauliat and M. Hardion for their most obliging help.

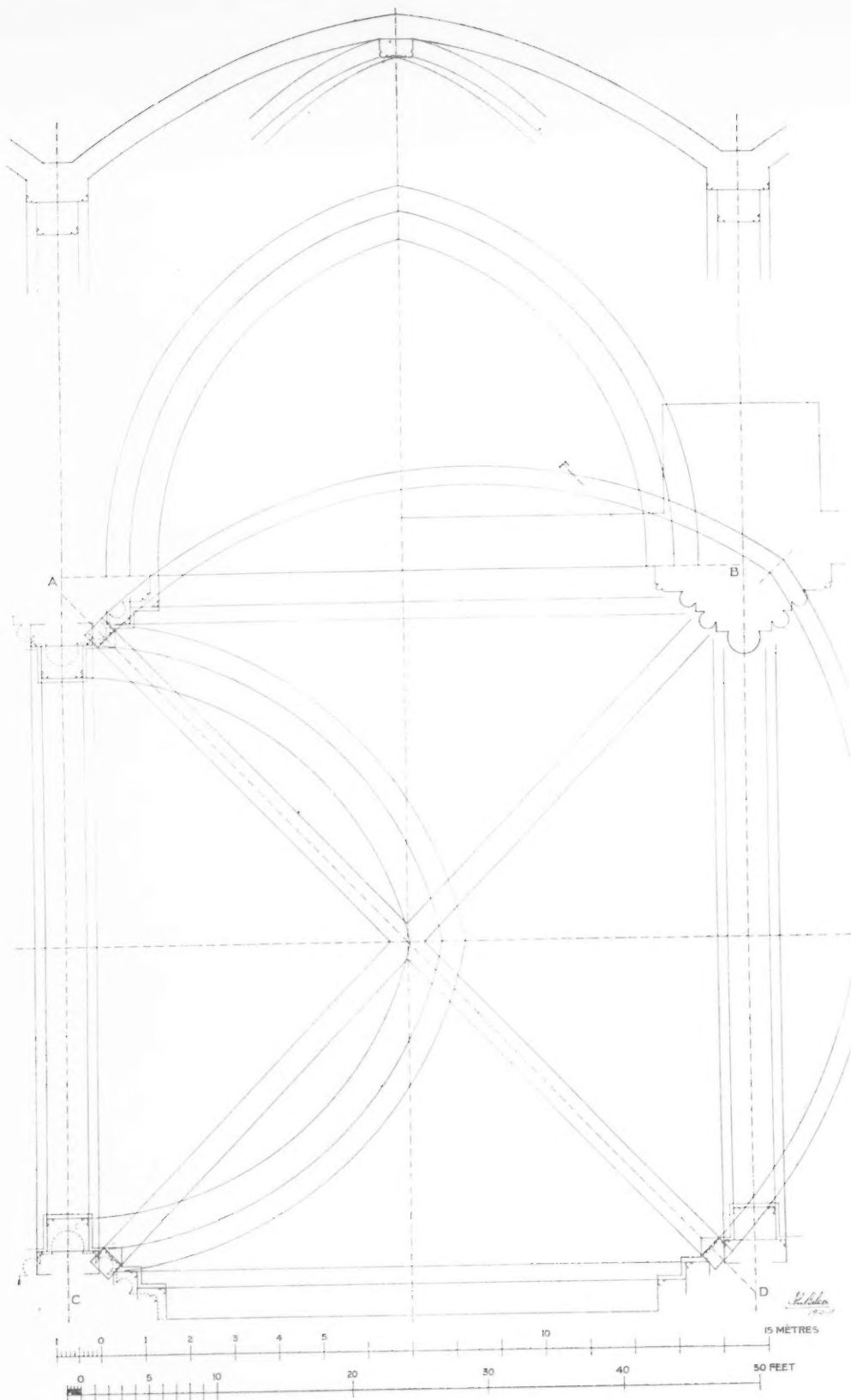


FIG. 1.—ANGERS CATHEDRAL: VAULT OF MIDDLE BAY OF NAVE.

to attempt an analysis of the construction, especially as regards the question of the influence of the dome.*

To commence with the plan and general scheme of the nave. We know that the earlier nave and aisles were transformed by the builders of the twelfth century into a nave of a single span.† The width of the existing nave was therefore fixed by the width of the nave and aisles of the preceding church. The width of the middle bay, from centre to centre of the pillars, is 50 feet 8 inches. This is almost exactly the width of the nave between the piers which receive the wall-arches.‡ It is evident therefore that this was the square which was the basis of the setting-out of the nave.§

The pillars are composed, towards the interior, of five shafts—a larger one in the middle engaged on the face of a pilaster, flanked by two on each side engaged in the re-entering angles of the pillar.|| The middle shaft receives the transverse arch of the vault; the next shaft on each side receives the diagonal rib; and the other receives the outer order of the wall-arch. Alone no independent support is provided for the outer order of the transverse arch. Beyond the shafts, the face of the wall is recessed under a great pointed relieving arch, below the wall-gallery which runs in front of the windows and through the pillars. Above this gallery, a pier, the face of which continues the face of the wall below, receives the inner order of the wall-arch. The nave is lighted by two windows with semicircular arches, above the wall-gallery, in each bay.

It must be remarked that the general type of plan, and much of the general scheme, of this nave is derived from the domed churches of Aquitaine. The nave of Angoulême Cathedral and the nave of the abbey church of Fontevault may be taken as typical examples. We see the same plan of a wide unaisled nave, divided into great square bays. In the internal elevation, too, there is much resemblance. In place of the wall-arcade beneath the gallery at Angoulême and Fontevault, we find at Angers a single great relieving arch. Above, the idea is the same—a wall-gallery below two windows in each bay. In the structural organisation we see the same concentration of the masonry of the wall into the pillars and buttresses at the points of abutment to counteract the thrusts of the vault, and the same tendency to reduce the wall between the abutments to a mere screen, which are essential characteristics of the architecture which we call Gothic. However, whereas at Angoulême and Fontevault the pillars are for the most part internal, and the buttresses form only slight projections externally, at Angers the projection of the pillars internally is very much less, and they are reinforced by external buttresses of great width and projection.¶ Consequently the wall-arches have considerably less depth. At Angers, however, the form of the pillars themselves is essentially different. Instead of the great square masses of masonry with engaged half-shafts to receive the transverse arches, wall-arches, and pendentives of the domed churches, we find at Angers pillars which are organised into a group of shafts, each of which is designed to receive its own member of the vault. In fact the plan of these pillars proves that the ribbed vault was provided for from the first, and, except that the outer order of the transverse arch has no independent support, the pillars were arranged with perfect science and logic.

The vaults are true ribbed vaults. Their membering, which is completely organised,

* All the following observations apply to the vault of the middle bay of the nave.

† L. de Farcy, *Les fouilles de la cathédrale d'Angers*, in the *Bulletin Monumental*, lxxvi. 488.

‡ The clear width of the nave between the principal shafts of the pillars is 41 feet 6 inches. The extreme internal width between the walls above the galleries is 54 feet 6 inches.

§ In consequence of the width of the transverse arch, the

vault itself, within the transverse arches and wall-arches, is not exactly square, but measures about 16 inches more from north to south than from east to west.

|| Fig. 1 shows the plan at the springing of the vault, with the plan of the pillar indicated by dotted lines. For greater clearness, however, the plan at D shows the plan of the springing only, and the plan at B shows the plan of the pillar only, with the wall and buttress.

¶ See fig. 1, at B.

consists of transverse arches and wall-arches, each of two orders, and of diagonal ribs of a single order. All these arches are pointed.*

The intrados of the inner order of the wall-arch forms almost exactly an *arc en tiers-point*, properly so-called; that is, the centres are placed at points which divide the span approximately into three equal parts.†

The intrados of the inner order of the transverse arch is a little more obtuse than the *arc en tiers-point*. As the span of the transverse arches is greater than that of the wall-arches, the crowns of the former rise to a slightly higher level than those of the latter.

The diagonal ribs are pointed still more obtusely; the distance between the centres of the curves is less than a quarter of the span of the intrados.‡

As a consequence of these forms, the crown of the extrados of the diagonal rib (the soffit of the cell) is about 11 feet above the crown of the wall-arch, and about 10 feet above the crown of the transverse arch.§

Each order of the transverse arches and of the wall-arches is moulded with a roll on the angle. The diagonal ribs are carved with a series of four-petalled flowers on the soffit, between a roll on each angle. The chamfer on one side of each of these rolls is ornamented with little semicircular scallops. All the rolls are stopped square a little above the abaci of the capitals (see fig. 2).

It should be noted that the pointed transverse and wall-arches have keystones, not a vertical joint at the apex.

The cells are carried on the backs of the diagonal ribs, which are not rebated to receive them.|| The abaci of the capitals from which these ribs spring are set square, not diagonally in the direction of the rib.

The cells of the vault are regularly worked and coursed. Their thickness (measured near the crown) is 1 foot 8 inches, and the average width of the courses is $9\frac{1}{2}$ inches, measured on the extrados, where the thickness of the joints shows as $1\frac{1}{2}$ to 2 inches. At the ridge of the cells, there is not a vertical joint, but a course of keystones, the width of which measures about $12\frac{1}{2}$ inches on the extrados. The courses of the cells intersect over the backs of the diagonal ribs, more or less in herring-bone fashion.

The cells are concave in both directions, i.e. the courses are arched from the diagonal rib to the transverse arch and to the wall-arch. This concavity at the longitudinal ridge of the vault is shown by the section at the top of fig. 1.¶ Measured normally to the curve, the concavity of the intersection of the cells at the ridge gives a height of 1 foot 6 inches on a chord of about 24 feet.**

The cells are built with the joints of their courses parallel with the ridges, except as to

* In fig. 1, the dotted centre lines AC and AD on the plan represent the springing lines on which the curves of the transverse arch and the diagonal rib are set up. The dotted line AB represents the springing line for the curve of the wall-arch, and for the longitudinal section of the crown of the vault.

† The considerable thrust along the walls of a vault of this kind necessitated powerful wall-arches.

‡ The height from the floor to the tops of the abaci of the capitals is 41 feet $4\frac{1}{2}$ inches. The height from the floor to the crown of the extrados of the diagonal ribs (soffit of cell) is 81 feet.

§ These measurements are deduced from my drawing, and are as nearly accurate as I have been able to make them, without more precise measurement which would only be possible from scaffolding.

|| The statement to the contrary in E. Corroyer, *L'Architecture gothique*, p. 25 and fig. 8, A (p. 22 of the English translation) is quite erroneous. It is remarkable that this mediocre book should be one of the few French works on

architecture which have been translated into English, and it is perhaps still more remarkable that it figures among the books which the R.I.B.A. recommends to students.

¶ From the measurements which M. Hardion kindly took for me.

** Architects have frequently drawn the section at the crown of such vaults as if the ridge line was a continuous segment of a circle, from the crown of one transverse arch over the crown of the diagonal rib to the crown of the other transverse arch, and the vaults of the nave of Angers are so drawn in the sections in E. Corroyer (*L'Architecture gothique*), and in Dehio and von Bezold (*Die Kirchliche Baukunst des Abendlandes*, pls. 107, 108). It will be seen from the section on fig. 1 that the ridge line (which is merely the result of the intersection of the cells) is really pointed at the apex. The sections in Dehio and von Bezold are much more correct than those in Corroyer, though in both the masonry courses are shown much larger than they actually are.

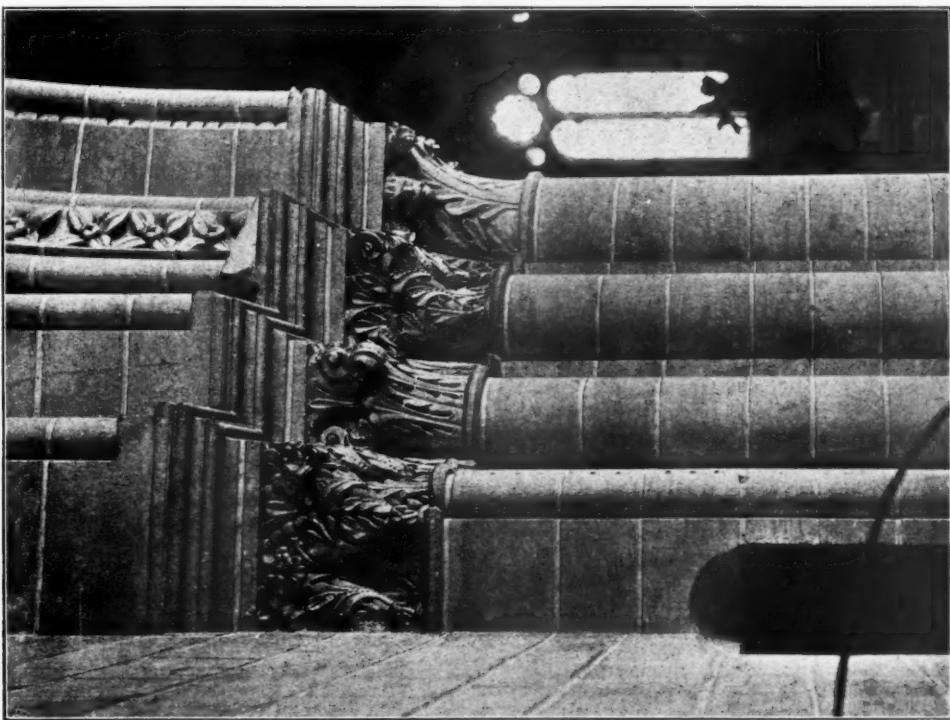


Photo. Mon. Hist.

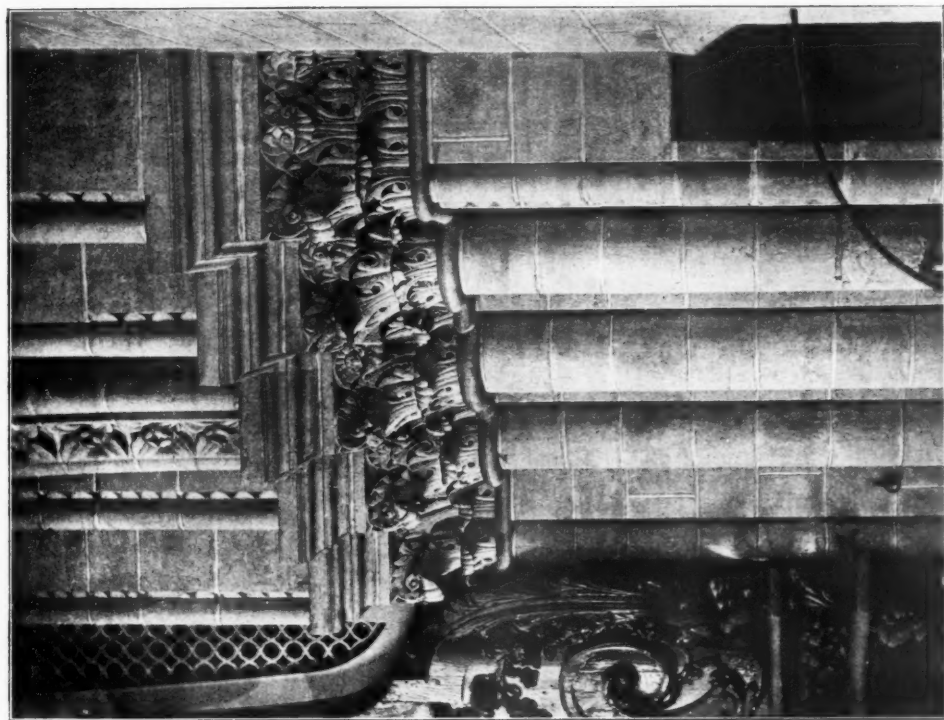


Photo. Mon. Hist.

FIG. 2.—ANGERS CATHEDRAL: CAPITALS OF NAVE VAULTING SHAFTS.

their lower parts towards the springing. Here the direction of the lower joints seems to be more nearly perpendicular to the centre line of the cell, but the succeeding joints incline gradually and quickly upwards towards the diagonal rib, so that they soon become parallel to the ridge.*

Such are the vaults. If we climb up to the roof, and see them from their upper side, with their immense cells rising some ten feet above the crowns of the transverse arches, we are scarcely surprised that such vaults have been called "*coupoliformes*," "domical." However, it will be well to examine more closely the question of precisely what traces of the influence of the dome these vaults do really exhibit.

Let us begin with the arch-curves, which really determine the form of the vault.

The development of these so-called "domical" vaults has been traced from the *coupole à pendentifs non distincts*,† such as those over the crossings of Saint-Martin, Angers, and Fontevrault, through the ribbed vault such as that of the first floor of the Tour Saint-Aubin, Angers,‡ where the vault has the form of a dome and the cells have the *appareil* of a dome, to

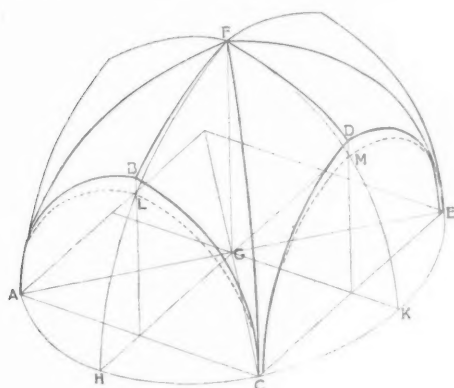


FIG. 3.

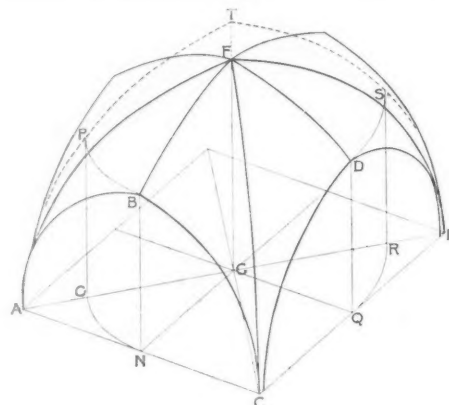


FIG. 4.

the *bombé* ribbed vaults, such as those of the nave of Angers Cathedral. The suggestion is that the builders of these latter deliberately adopted this *bombé* form in imitation of the dome. Let us see how far this is true.

Fig. 3 is a diagram of the vault in which the curves of the arches and the lines of the ridges are represented by strong single lines; AFE and CF being the diagonal ribs, ABC the transverse arch, and CDE the wall-arch. If the builder had intended to give the vault the form of a dome, we may imagine that, having first determined the pointed arch form of the diagonal rib, he might have fixed the heights of the transverse arch and wall-arch by a revolution of the curve of the diagonal rib on its vertical axis. Suppose a revolution of AF on its vertical axis FG, the curve of this revolution HF would intersect the plane of the transverse arch at L, and the revolution FK would intersect the plane of the wall-arch at M; and these

* This is also to be seen in the cells of other vaults of this school, as for example those of the naves of the cathedral and La Couture at Le Mans.

† Dome generated by a semicircle on the diagonal of the square, for which we do not seem to have any short name in English. I have also retained the French terms *appareil* and *bombé* as more precise than any corresponding English terms (using *bombé* as describing vaults in which the crowns

of the diagonal ribs are at a higher level than those of the other arches of the vault). The use of "domical" for *bombé* is misleading when it is applied to vaults the construction of which has nothing in common with the dome.

‡ For an analysis of the structure of this vault, see C. H. Besnard, *La coupole nervée de la Tour Saint-Aubin d'Angers*, in the volume of the *Congrès d'Angers*, vol. ii. p. 196.

two points L and M might have been taken as determining the heights of the two arches in question. It is necessary to observe that the curve produced by the intersection of the plane of the transverse arch ABC, and of the plane of the wall-arch CDE, with the surface generated by the revolution of the diagonal rib AF, would be neither a pointed arch nor a segment of a circle, but an ovoid curve. If, however, we substitute for this ovoid curve a pointed arch of the height fixed as suggested above, struck from centres on the springing line, we should obtain the curves indicated by the dotted lines ALC, CME, instead of the actual curves ABC, CDE. In other words, if this method had been adopted, the points of the transverse arch and wall-arch would have been some 3 feet lower than they actually are.

If we imagine that the builder employed the inverse method, and developed the height of the diagonal rib from those of the transverse arch and the wall-arch, fig. 4 shows what might have been the result. From a centre on the vertical axis FG, describe a circle BP (NO on plan) from the apex of the transverse arch B; and, from the same centre, describe a circle DS (QR on plan) from the apex of the wall-arch D. The curves of the diagonal rib, described from centres on the springing line AGE through the points P and S, would be indicated by the dotted lines APTSE, instead of the actual curves AFE.* In other words, if this method had been adopted, the apex of the diagonal rib would have been some 7 feet higher than it actually is.

It is evident, therefore, that the curves of the arches were not precisely determined by the form of the dome.

What the builder really did was apparently something much more simple. For the transverse arch and wall-arch, he adopted the *arc en tiers-point*, or something near it. He might have made the diagonal rib semicircular, in which case the vault would still have been *bombé*†; but a semicircular diagonal rib of the immense span of 63 feet would have involved serious risk of settlement at the crown. He must have been well aware of the advantages of the pointed arch, for the use of which he had precedents in abundance. The pointed arch had been used systematically for the transverse arches and wall-arches in the domed churches of Aquitaine; it had been used in barrel vaults and groined vaults in his own country; to say nothing of many examples in other districts. He therefore adopted for the diagonal rib the pointed form, which was the strongest and most suitable for his purpose, but, in order to avoid its rising unnecessarily high above the crowns of the other arches, he gave it a form considerably more obtuse than that of his other arches. The *bombé* form of the vault was the inevitable result of the forms adopted for the arches.

While the forms of the arches may thus be accounted for by structural reasons, it is necessary to take into account the possibility of the influence of such a vault as that of the first floor of the Tour Saint-Aubin at Angers. In this vault the four cells, which have the form and *appareil* of a dome, are intersected by the diagonal ribs, which are interrupted at their crown by a central eye.‡ These diagonal ribs, if produced through the eye, would have (if I am not mistaken) a slightly pointed form. The revolution of a curve of this form on its central axis would give a curve of intersection, with the side walls, of ovoid form, for which were substituted, in the actual work, pointed wall-arches, which must have involved some slight departure from the true domical form for the cells. Considering only the curves of the arches, they show a marked similarity of system to those of the nave vaults of the cathedral, and it is more than probable that the builder of the latter, in designing the curves

* In fig. 4, the curve of the diagonal rib is not obtained by a revolution of the *curve* of the transverse arch, for in that case the former would not be an arc of a circle. The two points P and S being fixed as suggested above, the dotted lines represent arcs of circles drawn through these points from centres on the springing line. This diagram is simply given as an illustration of a possible method, though I do not suggest it as probable.

† If the diagonal rib had been semicircular, its crown would have been about 3 feet 4 inches above that of the transverse arch, and about 4 feet 4 inches above that of the wall-arch, instead of these dimensions being, as actually, about 10 feet and 11 feet respectively.

‡ See L. de Farcy, *La Tour Saint-Aubin à Angers*, in the *Bulletin Monumental*, lxx. (1906), p. 538.

of his arches, was following to a great extent what had already been done at Saint-Aubin, although the vaults differ radically in point of structure. To this extent, therefore, it seems to me to be true to say that the vaults of the nave of the cathedral show the influence of the dome, or rather of a type of vault which itself retained much of the form and structure of the dome.

To turn now to the form and structure of the cells of the vault. We have seen that the forms of the arches were not such as to give to the whole vault the form of a dome. This is confirmed by an examination of the form of the cells. Fig. 5 is a quarter-plan of the vault, on which ABC represents a horizontal section at the height E on fig. 1. If the vault really had the form of a dome, this horizontal section would be a circle; it is actually an irregular octagon with curved sides. The line

where the courses of the cells intersect over the back of the diagonal rib is marked by a distinct angle on the extrados at B, as can be clearly seen from the upper side of the vault.

In support of the idea that the vault retains much of the structure of the dome, it has been urged that the cells towards their springing do not form a groin, but are inflected, as they would be if the vault were "domical." This is not exactly true, as will be seen from fig. 5, where DD', EE', FF', GG', HH', and II' represent horizontal sections* of the intrados of the cells at various levels. The direction of the cell at I', H', G', and F' is such as would form a groin, though this is not the case on the opposite side of the diagonal rib at I, H, G, and F. But this simply results from the relative positions of the arches at their springing and from their curves, and has nothing

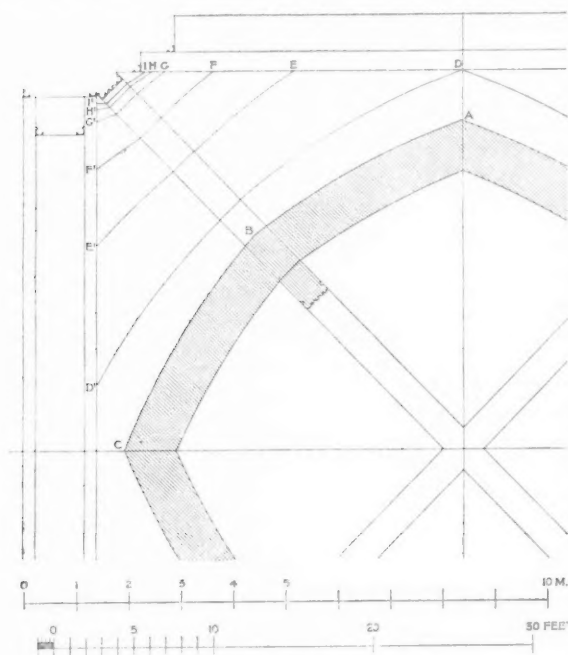


FIG. 5.

to do with the characteristics of dome construction.

However, it is not in the least degree probable that the builder concerned himself at all with the horizontal section of the cells, for he built them, not with the horizontal concentric courses of a dome, but in courses parallel with the ridge,† with the *appareil* of a groined vault.

It should be noted, too, that each single cell is not in itself a portion of a sphere. If we develop a sphere from the two arched sides which bound the cell, we shall find that the curve of the ridge-line is too flat (*i.e.* is of too great a radius) to coincide with the surface of such a sphere. In reality the surface of the cell was developed by lines drawn from transverse arch to diagonal rib, and from wall-arch to diagonal rib, following the direction of the joints of the courses, and by giving to the courses the determined degree of concavity. The result is a surface which is incapable of exact geometrical definition.

Was the idea of arching the cells derived from dome construction? It is possible, though

* Not the joints of the courses.

† Except immediately above the springing, as before described.

it scarcely seems to me to be probable. Viollet-le-Duc, who certainly cannot be accused of underestimating the influence of the dome, says—"Puisque les constructeurs du *xii^e* siècle détachaient les nerfs de la voûte, qu'ils en faisaient comme un cintrage permanent, il était naturel de *voûter* les remplissages sur ces nerfs, c'est-à-dire de leur donner en tout sens une courbure qui reportât réellement leur pesanteur sur les arcs."^{*} We find, indeed, in other districts that very soon after the builders began to construct the cells of their vaults in courses of worked stone,[†] they introduced the improvement of arching the cells, quite naturally as Viollet-le-Duc said, and this in vaults in which it is very improbable that the dome had any influence whatever.

There remains the method of jointing the cells. Viollet-le-Duc[‡] and Choisy[§] describe the method of the Gothic builders (Viollet-le-Duc says, "la méthode des premiers constructeurs gothiques") as obtaining the direction of the joints by a division of the two sides of the triangle into an equal number of parts. Choisy^{||} speaks of this as the method of the Ile-de-France, which "donne des fuseaux où la largeur de douelle varie d'une extrémité à l'autre." With this he contrasts the method of the Angevin builders, who "dominés par les traditions de la coupole, donnent aux fuseaux de leurs voûtes une largeur de douelle uniforme." The cells of the nave vaults of Angers Cathedral are indeed jointed in this manner, but is it necessary to see in this any connection with the traditions of domical construction? Whether this method was derived from the dome, or from the groined vault, it is only to be expected that the builders of the early ribbed vaults would adopt the simplest method of building their cells in parallel courses as far as practicable. In the earlier *bombé* ribbed vaults of the Ile-de-France, I believe that it is common to find that the courses of the upper parts of the cells are parallel with the ridge, although the precise fashion in which the transition is managed between these and the different directions of the lower courses varies in different examples. Even in Angers itself, we find a precedent for the parallel jointing of worked courses in the groined vaults of the lower story of the Evêché. It seems to me, therefore, that there is no reason to attribute this method to the influence of domical construction rather than to that of the groined vault.

From the considerations discussed above, it seems to me to follow that the nave vaults of Angers Cathedral are true ribbed vaults, which have neither the form, nor the structure, nor the *appareil* of the dome. The difference between the vaults and the dome is so great that the practice of domical construction could never have led to the conception of such vaults as those of this nave. At the same time, it seems to be certain that the system of arch curves, which gives to these vaults their characteristic *bombé* form, is related to that of such dome-shaped vaults as that of Saint-Aubin, and that to this extent it is true to say that they retain something of the influence of the dome in their general form, though not in their construction.

If these conclusions be true, it almost necessarily follows that they will be equally true of the other early ribbed vaults—the so-called "domical" vaults—of the Angevin and neighbouring schools. It may be suggested, indeed, that the *bombé* form which is characteristic of many of the early ribbed vaults of the Ile-de-France was not a form which the builders consciously aimed at as desirable in itself, but was rather the natural result of the forms of arches employed for the rib-skeleton. How far this is true of the later and more complicated vaults of the Angevin school would be an interesting subject for research, which would demand an analysis of their structure and rib system, based on accurate measured drawings.

* Viollet-le-Duc, *Dictionnaire*, ix. 501.

† As contrasted with rubble courses, plastered on the soffit.

‡ Viollet-le-Duc, *Dictionnaire*, iv. 103.

§ A. Choisy, *Histoire de l'architecture*, ii. 271.

|| *Ibid.* ii. 276.

If it be true that the nave vaults of Angers Cathedral show so little of the influence of the dome, it is unnecessary to go to the other extreme, and explain them simply as an importation from the Ile-de-France, of which there is no proof either historical or architectural.* We have seen that the actual vaults were provided for from the very beginning of the nave, and, as Herr Dehio pointed out sixteen years since, the vast dimensions of the building necessitate the date of its commencement being put back at least eight or ten years anterior to the recorded date of the construction of the vaults themselves. It is just possible, therefore, that the constructors of this nave might have known the narthex and choir of Saint-Denis, but there is nothing to indicate that Saint-Denis had any more influence on Angers than it had on the similar vaults of the nave of Le Mans Cathedral, which nave is attributed to 1142-1158. These vaults do indeed show some characteristics analogous to those of the Ile-de-France, but it does not necessarily follow that the one was an importation from the other.

This is not the place to discuss the controversial question of the relative dates of the earliest ribbed vaults; and indeed of the precise course of the development which led up to Saint-Denis and the nave of Angers we still know but little—naturally, perhaps, in view of the fact that the great majority of the earlier attempts must have disappeared. Of the pre-eminence of the school of the Ile-de-France from Saint-Denis onward, there can be no dispute. As, however, there has been a tendency to attribute to this school far too important a part in the earlier stages of the development, it is perhaps well to remember that Saint-Denis is the earliest example of the ribbed vault in the Ile-de-France of which the date can be proved with certainty by documentary evidence. It is well to remember, too, that some of the more important examples which are undoubtedly earlier, such as the vaults of the eastern bays of the south aisle of the nave of Saint-Etienne, Beauvais, and those of the ambulatory of Morienvall, indicate by their methods of construction and system of rib-curves that they themselves do not represent the very earliest attempts in this direction, and that they are indeed less rudimentary than some examples which are to be found in other districts. During the first half of the twelfth century, the Angevin builders were experimenting with various kinds of vaults, but it is not clear precisely how they reached the stage represented by the vaults of this nave. Influence from the Ile-de-France is possible; influence from other neighbouring provinces is also possible; and the skill of the Angevin builders in vault construction must have counted for much. For what, I think, is certain is that nothing more perfect and scientific, within their limitations, had hitherto been built than the vaults of this nave. From them the development proceeded on very individual lines, and produced a school of vaults differing in marked fashion from those of other schools.

The study of the vaults of the nave of Angers Cathedral suggests a reason for testing the truth of a current theory on the origin of the ridge rib. In certain groups of vaults, the direction of the courses of the cells towards their crowns is not parallel with the ridge, where on the contrary the joints meet obliquely.† The theory in question suggests that the ridge rib was introduced in order to mask the oblique intersection of the courses of the cells at the ridge, and that it was, in origin, simply a cover-joint.

The Angevin school admittedly used the ridge rib from a very early date. However, in

* See the judicious observations on this subject by Herr G. Dehio in his *Die Anfänge des gotischen Baustils*, in the *Repertorium für Kunstwissenschaft*, xix. (1896)—of which a short summary was given in the R.I.B.A. JOURNAL, VI. (3rd series), 267.

† This is frequently called the "English" method, and it is certainly very common in England during and after the thirteenth century. In the second half of the twelfth

century, however, joints parallel with the ridge are, I believe, more usual in the English vaults, and they are not uncommon in the thirteenth century. It is curious, too, that the earliest rudimentary example which I have seen of the so-called "English" method is to be found in the Ile-de-France, in the vault of the straight bay of the choir of Morienvall (see illustration in *The Builder* of 16th July 1910, p. 77).

the simple quadripartite vaults of this school which immediately preceded the vaults with ridge ribs, the direction of the joints of the cells towards the crown is always parallel with the ridge (so far as my own observation extends); it is so, for example, in the vaults of the nave of Angers Cathedral, of the nave of Le Mans Cathedral, and of the choir of Saint-Pierre, Saumur. So also, when they began to add the ridge rib to simple vaults of this kind, the direction of the joints of the cells is parallel to the ridge rib, as in the vaults of the transept of Angers Cathedral, of the choir of Saint-Martin, Angers, and of the nave of La Couture, Le Mans. As there was here no obliquity in the joints of the cells to be masked at the ridge, these vaults certainly do not support the cover-joint theory of the origin of the ridge rib, to which I have referred.

The same thing is to be observed outside the Angevin school. In such rudimentary applications of the ridge rib as are found in the western bay of the nave of Airaines (Somme),* and in the aisle of the north transept of Ripon Cathedral,† the joints of the cells are parallel with the ridge rib. It is remarkable, too, that in the vaults with ridge ribs at Lincoln Cathedral, which are among the earliest examples of the systematic use of the ridge rib in England, all the cells are jointed parallel with the ridge rib.‡

In Angers itself, the choir of Saint-Martin suggests an explanation of what may well have been the true origin of the ridge rib. The vault of the western bay has a ridge rib on which the ridge of the cell does not rest directly, but, as the ridge rib has a lesser radius than the curve of the ridge of the cell, there is a narrow spandrel of wall between the back of the rib and the soffit of the cell.§ In the eastern bay the cell lies directly upon the ridge rib, in the normal manner.

It seems to me, therefore, that the real origin of the ridge rib was structural, and that it was introduced with the idea of stiffening the rib-skeleton of the vault.

* C. Enlart, *Monuments religieux de l'architecture romane et de transition dans la région picarde*, p. 52, and fig. 35; *Manuel d'archéologie française*, i. p. 38, fig. 19.

† Last quarter of the twelfth century.

‡ The same thing is true of the vault (with ridge ribs) of the vestibule of the chapter-house of Furness Abbey (middle of thirteenth century). However, in the choir

vaults of Ely cathedral (dedicated in 1251), the joints of the cells cut the ridge ribs obliquely.

§ It may be suggested that there is a possible connection of idea, by way of the nave vaults of La Trinité, Angers between this vault and the quasi-sexpartite vaults of the Norman school in which the intermediate transverse rib carries, not cells, but a wall. The structural motive seems to be the same.

ARCHITECTURAL CRITICISM.

Inaugural Address at the School of Architecture, Victoria University, Manchester, 7th October 1912.

By PROFESSOR ARCH. C. DICKIE [A.].

My address takes the form of more or less random impressions occurring in the presentation of architectural thought. So curiously complex are the avenues along which students embark on the study of architecture that it is with some misgivings I make the attempt to draw out of them some kind of understanding. At first sight, this point of view would appear to be overstrained. On more intimate relationship, however, with the student and his prejudices, his logical support of certain accepted canons, and his altogether illogical and wholesale condemnation of vast tracts of architectural fertility, his bigotry is revealed. Be the starting point ever so sane, he, being human, as becomes his studentship in the highest degree, must wander through the forest to the open light as best he can. Let this starting point be at the hut of simple housement, four square to the elements, built in accord with the obvious suitability of the materials at hand: a sense of the needful in building is presented which it is well for him never to forget. The architecture of his stirred imagination is a growth which has no definite form, but which flowers in proportion to the volume and quality of his building sense—that much and no more. It yields as yet nothing, but it begets a kind of architectural vagrancy, an impelling inner desire to become acquainted with the monumental evidence of history. The forest through which he wanders is the aggregation of styles and phases of styles which crowd around him, and which, at first, bring enlightenment through the very unsettlement of his mind. If he be searching with sympathy, some new beauty is constantly appearing in his path, and off he is switched, whole-heartedly, to his new love. Just as before, we found him happily confined within the compound of classic severity, so do we later find him revelling in the glorious freedom of Mediæval emancipation. This point in his wanderings he has reached by devious paths, in spite of himself, by gathering where before he disdained even to look. Having so opened his heart, he can now look back over the area of the ages and say, Truly the works of man are great, but surely the greatest of all are these monuments for the housement of God and man.

To have reached this point is promise of well-being. Between the two extremes of style there are stopping points beyond which many have not sought to venture. A choice is made which is the best, and gives the greatest joy. In short, it becomes the adopted style or phase of style. The eye and the mind have snapped together and are closed to the beauties of all others, which

henceforth rank in their minds as minor efforts. There are others who have not even cared to inquire, but who have made an early choice. Having so declared themselves they are in no temper to alter.

Looked at as a business proceeding, this latter has much to recommend it. No time has been lost, and practice in the chosen style is a matter of expediency, since it has been chosen because of its popularity. No emotions have been wasted, but what a world has been missed! In defence, it is argued with truth, that the old masters had no concern for anything but their own style. In reply, it can be argued with equal truth that these old masters lived and practised an architectural life which was theirs and theirs alone. Their blind enthusiasm for a new creation was far removed from the gathering together of borrowed forms, however skilfully rearranged.

It has been given to some men the title to raise these bygone forms to life again, and to instil the real spirit of their origin. Such men are few, and all honour to them. The result has justified the method, whatever it may have been. It would be surprising, however, if such greatness were achieved by any other course than that of close intimacy with the outward forms of the style, and closer intimacy with the spirit of the social and religious life of its period. Although termed "revival," these works were so spontaneous that they may be classed with the best of a greater past.

It is the fashion, nowadays, to delight in originality, and among students there is a growing passion to appear in their so-called originality before they have looked into the heart of things. Like the former instance, they have made an early choice, but, unlike it, they have chosen from a by-path. Certain practising architects of the present day have produced a distinct and highly meritorious individuality. It is original, but the student's copy of it is not. It will be well for him to remember that whatever talents he may be blessed with, will be developed far more perfectly, by a study of the mature work of old masters, which he so readily despises as the effort of a worn-out past.

In discussion, it is a difficult matter to make headway with the man who supports his argument by the statement that this or that phase of style is not to his liking. A certain building bears no ornament, its severity is its charm. Another building is richly ornamented, and on that account is condemned. The basis of criticism becomes a question of plain *versus* enriched surfaces, and the prejudice against one or the other obliterates the main point at issue. How often has one heard some such criticism as "I like Gothic, but I cannot abide any other style," or such a ridiculously thoughtless remark as "English Renaissance for England." One has also heard that Byzantine is exotic, and unsuitable to this country, in spite of the fact that it is a style so logical in construction and so adaptable to

modern needs that it must appeal to all the world wherever men have learned the elementary art of building one stone upon another. What we owe to exotic architecture in the past should not easily be forgotten, but the curious fact remains that it is forgotten.

The deplorable condition of the public mind towards architecture is a subject frequently discussed, and it is encouraging to find in certain quarters a steadily increasing interest (especially in domestic work), which will, it is hoped, develop into more than individual movement. The process is slow, however, as indeed it must be. Knowledge of architecture is not easily attained. Although it seems comparatively easy for a layman to acquire a sound knowledge of pictorial art, constructional beauty is a thing which cannot be seen without devoting much more time to its study than is possible for the great majority. The triumph of repose and of grouping, the shapeliness of mass, the proportion and scale of parts, and the refinement of detail, are too subtle in their bearing upon each other to be grasped by any but the most serious student. The criticism of the public must always, I fear, be confined within certain indefinable limits which can only expand as the architecture with which it is surrounded increases in truth and beauty, and the public eye becomes unconsciously familiar with these qualities. The position of architecture in the world's history, the public have not realised. If enough interest could be awakened to extract acknowledgment of architecture as even an art of sorts, there is hope that, in the fullness of time, it may be recognised as the greatest of all arts. Architects frequently say we must educate the public before we can have good architecture. It would be nearer the mark to say we must have good architecture before we can educate the public. Let architects themselves first be educated into some harmony of opinion as to what is good and bad in architecture. If they are still so far from agreement, how can the public be expected to be any better? One has only to listen to the varied criticisms of modern buildings made by one's fellows to be convinced that the subject is approached from divers standpoints, and that conclusions are tempered by the various prejudices with which we appear to be afflicted.

Architectural prejudice is very much like the prejudices affecting every-day life. For the sake of illustration, let a subject be set. It is assumed that the plan is agreed upon and that the arrangement has been favourably judged. Look then at the elevation. Is it suitable to the uses of the building? Does it echo the plan? Are the mass and grouping of pleasing proportion and suitable to the site? If these also are admitted, it must be agreed that the main elements of greatness are there. Are they worthily supported by scale and grouping of voids and solids? Are the main

details successfully applied? Have they been instilled with beauty of character? So might the inquiry be conducted. But it is in minor matters that opinions differ so greatly. Some monotony or some extravagance, some heaviness or some lightness of detail, and so the whole criticism becomes pivoted on what is comparatively unimportant. Prejudice steps in to deaden the eye. Have these details got character? might be more pertinently asked. Do they reflect, along with the other elements of the design, the individuality of the designer? Does the building live? If the answer be in the affirmative, then the work is raised in the ladder of distinction. There are façades in which no fault of detail can be found, but which are poor, sapless imitations. Although superficially the eye is satisfied, the pleasure is transient, for in this heart there is no throb. Be the former example less true to rule, it has added something to the history of its time. It is proof of the expressional calibre of its designer, who has a building soul above machine-like copyism. His work is immediately raised to a higher plane of criticism, dealing with his power to instil individuality with beauty.

But the moment we have got thus far we are assailed by the enemy, who thrust legions of atrocities before our eyes, claiming them as products of this school of thought. Sober analysis, however, will weed out these by reason of their lacking in some or all of the main qualifications required to bring them into serious consideration as works of art. Individuality may be (and very often is) there, but in total ignorance of the fundamental principles of building design, lacking in all evidence of true building sense.

Compromise is sometimes arrived at by agreeing that it is a matter of taste, whereupon we find ourselves asking, whose taste? If we are always sure that the difference is only one of taste, then there is little to trouble over.

Properly to appreciate architecture, we must have acquired a claim to intimate acquaintance with its various phases, and the changes in these phases following national and social upheavals and subsequent consolidation: the history of peace and war and its effect upon the people, the conditions of prosperity through which the arts were fostered, as well as a close personal intercourse with buildings themselves. We must seek to understand the heart of a building as we would seek a closer knowledge of our fellow men. It is not enough that the eye alone should be pleased; that, as in human relationship, is flimsy contentment and a poor insipid acquaintanceship. The actual form of face and figure, however perfect, serves to entrance only for a moment if, when you have pierced the shapely exterior, you find nothing to stimulate your interest. The features, through which there shines a sterling mind, be they shapely or no, excite fond interest in a human asset. So

with buildings. But most buildings have character of a kind. So have all men. We must leave the intellect to separate the weed from the flower. Casual observation is insufficient; closer reading begets either more or less liking. As in the human instance, certain buildings grow beautiful as the mind of the observer grows in discernment and is able to read, in the hand of the designer, the nature of his architectural sense stamped in the line and texture of his building.

Let us apply this parallel to a criticism of the buildings seen in any ordinary street. It may be that we see a cube of fat pompously enriched in swarming exuberance, sweating with abundance, and crushing its less-prosperous neighbours with the very weight of its self-esteem. We may also see a gay coquette, in make-believe prettiness, tinkling a one-fingered accompaniment to a borrowed melody, impudently seeking applause.

On the other hand, it may be that we shall see a quiet, gray, thoughtful mass, lined and pierced with such skill that we are commanded to stop and look. Looking, we wonder at the perfect balance and proportion, the well-applied enrichment, the strength and beauty, the grace and culture, and the dignified consciousness of position in the world of works. When a building has raised such emotions as these, it not only manifests the genius of its designer, but stands as an essay on the highest human qualities to him who *may* know if he will read. The class of building matters little, be it church or warehouse; its character is established. The stamp of nature has welded it to its human fellow and none can separate them. It is both interesting and instructive to apply this human parallel to the study of buildings, and I believe it to be the most helpful avenue through which some understanding can be attained of that most subtle of all qualities—character.

There are no finer lessons in scale than are illustrated by the simple harmony of parts in the work of the Greeks, as compared with the scale harmony shown in, for example, the great Church of St. Sophia, Constantinople, in which a totally different problem has been solved. In the former instance, the almost ridiculously simple and few parts of the whole associate with each other and with the minor details in perfect unity. In the latter example, the problem was made immensely more difficult by the existence of a great central domed area, resting on tiers of orders which, without the friendly aid of surface decoration, would have appeared puny and insufficient. Such a mighty canopy, reckoned from the Greek lesson, demands supports equally mighty in scale and detail. But the Byzantine builders had conceived a new sense of scale, and by clothing the surfaces, net-like, in decoration the whole is drawn together in perfect harmony. How sensitive is the scale so obtained is shown by the Koran discs which have been hung upon the pendentives by the Mohammedans. Small though

they be in comparison with the mass in which they are set, they shock one's sense of harmony by reason of their overpowering scale in comparison with the detail. Their introduction has, at least, one great value to architects, in showing how easy it is to destroy the contentment borne by this form of architectural treatment and in conveying some idea of the decorative heights reached by these Eastern builders.

Faults in scale, occurring in Mediaeval work, do not cry out with the same discontent, and one becomes so absorbed in mystery that such defects, if they are defects, are unnoticed. The exuberant delight of the pinnacled groups of Mediaeval work, and the conscious efficiency of the great domed structures of other days, convey emotions of totally different nature. Gothic burst upon the world as the result of an architectural eruption from the crater of human expression. Religious enthusiasm reared, in a day, such a forest of offerings to high heaven that there is no period in history which can compare in the volume and tension of its abandonment to building. The crafts guilds, the members of which devoted their lives to the building passion of the day, with only one idea, directed the new school of building. Foundations were laid in their hundreds, and man was raised to one of his greatest periods as an artistic creature. The divine fire was in all men, and it burned in all their works. Such a condition does not now prevail. Christianity has become more closely wedded to charity, offerings take more practical form, and, much as it may move our artistic souls to sorrow, we must, I fear, seek other sources of inspiration. Churches are built, but they arise out of less mystery and romance. Their beauty is intended more to satisfy man than to appease God, and what we, in these days, can do without the old inspiration is but little.

The whole religious question raises apprehension as to the future of ecclesiastical architecture. Love and money are not now spent in a national rearing of such idols. Church building has become more a matter of business consideration. Committees discuss the cost at so much per sitting, Architects—in competition—strive to supply the article at that much; while people ask, Why is it that our modern Gothic lacks the spirit of the old? It would be a miracle if it did not. As architects, however, we have a great inheritance, and to him with a soul to stir, these monuments of ecstasy will ever remain as an inspiration and as a manifestation of the heights to which high ideals can raise both man and his work. We live in their shadow and we see them in the light of thankfulness.

The instructive period of the study of architectural styles is that of their birth and early development, the step by step of their growth which relates so clearly the ordinary need of time and place and the simple constructive answer. No

ingenuity has been called into service. I am convinced that our lesson lies in this and this alone. Our museum of something like 7,000 years' collection is our greatest burden if we refuse the truth of it. The stock-in-trade, from which we lazily draw, has begotten our stunted accomplishments and we remain contented with the ease of it.

There are many things which have combined to bring about this condition of things, and a word of excuse must be allowed in consideration of the difficulties surrounding the practising architect of the present day. It is an elementary truth that no architecture can be great which is not the natural outcome of the structure and the true expression of the plan. It is unfortunately common for architects to be called upon to produce a certain specified dignity out of a scheme which the demands of utility have robbed of all direct inspiration. Site values, cost of building, and revenue, together tax ingenuity to the utmost, so that the greatest possible commercial value may be attained. Planning in the grand manner becomes impossible. Nevertheless it is expected that the elevations shall express that very chosen character which has been denied to the plan. The position is absurd. The architect strives to create a dignified facing in a style—already approved—to an insignificant and cramped interior, and so nefariously appropriates a noble ancestry to hide a meagre origin. "The skeleton in the cupboard" must be hidden from the public eye, so that the truth be not known. How to surmount this difficulty who shall say?

Given the freedom of a plan of scale and proportional distribution the design of the elevations becomes a comparatively simple matter and the parts will fall together with astonishing success. Such opportunities, however, are rare. More often, the architect's skill is taxed to create out of tier upon tier of compartments—each occupying an insignificant area—an appearance of breadth and dignity of occupation which is altogether false. He forces the introduction of masses of constructive detail, so that the eye is diverted from the direct contemplation of the proportion of voids and solids. All the Renaissance, good and bad, is at his disposal, and more often the bad suits his purpose better than the good. Engaged columns, entablatures, broken pediments, swags, shields, all are juggled into make-believe, sometimes so dexterously that the result is admirable. But it is admiration for the "sleight of hand" which has so ably succeeded in deception. Were the whole truth and nothing but the truth to be told, the result would bear the first quality of good design, but what would the client say? So must critics, at times, deal leniently with the man who, in his perplexity, has chosen between two evils, remembering that, however much they would like it, our streets are not lined by Italian palaces.

The architect is confronted daily with such problems, and if he fails to find the right solution

it is only what must be expected. It is easy to write of high ideals and to cry out for unflinching loyalty to the truth, but it is easier to turn to the drawing-board and break every one of them.

"Design in truth and build in beauty" is a worthy ideal which it is well to nurse,² but it appears at times to the faint-hearted that the world stands four square against it. Some, however, are more optimistic, and still believe that by keeping this ideal constantly before us good must come. If there can be no beauty without truth, then we must aim at preserving the truth in as great a measure as possible. We must relinquish it grudgingly and, as we progress, seek to recover what has lapsed.

Architects do not care to risk their reputation on experimental effort, as the heroes of the air risk their lives with such marvellous readiness. The endeavour to display in design the direct outcome of constructive need—at the same time wedding that need to the temper of the design—is a making of terms both tactful and sound. Architecture, at its best, shows that the problem of pure construction has been faced with candour and incorporated as the basis of form and detail.

To-day a new constructive element has appeared which as yet has been denied the right to govern form. It is too revolutionary, however, to stand aside. The powers of reinforced concrete are too great, and architectural veneer too small, to admit of any doubt. The accepted classic rules are unsuitable, for they grew out of different materials. To subdivide the spans of a ferro-concrete interior with brick or stone bays, expressing the limitations of a less expansive material, is inartistic, and, whether we like it or not, some new way must be invented.

Great spans, such as this construction makes possible, affect scale, we complain. But long years ago the domes of Byzantine churches created a similar disturbance in the minds of their builders. We have only to look and see with what success the difficulty was then overcome.

Our house must be put in order. The problem must be faced in the same practical manner, and our heads must no longer be buried in academic sand. The engineer and the architect in past days were one. Science has advanced the engineer to independent greatness, and the architect must needs advance himself into partnership, so that they two may become builders in the best sense.

Architecture is talked of as a thing of two sides, constructional and artistic. Surely all decorative art is constructional in its composition. Architecture, being primarily constructive, cannot be denied the same inter-association. To separate the two is impossible, since without the one the other cannot live. Many have attempted to tell the difference between building and architecture with no success. What a poor thing architecture is when it claims superiority to building!

To cry out for the past will avail nothing. As

well-wishers of architecture we must study the past in all its greatness and apply its lesson in all truth. Out of the melting-pot of ideas will come some new thing to carry conviction. The new will not be forced back to the old, but for the needs of the new we must know the best of the old.

It is worth repeating that the most fruitful periods of the old are the births and early lives of the styles. The down grade can be told in a chapter, yet what volumes of it are thrust before the trusting student in spite of the glower of facts. I am conscious of the pitfalls which abound and of the inconsistencies inevitable in the reasoning upon which I have embarked. The subject is hedged around by the clash of practice and theory. If it would appear that history has been decried, let it be clear that the complaint is not against history, but against the too ready acceptance of its face value.

REVIEWS.

TWO BOOKS ON ENGLISH CASTLES.

1. *The Early Norman Castles of the British Isles.* By Ella S. Armitage. With Plans by D. H. Montgomerie, F.S.A. Medium 8o. Lond. 1912. 15s. net. [John Murray, Albemarle Street, W.]
2. *Military Architecture in England during the Middle Ages.* By A. Hamilton Thompson, M.A., F.S.A. Illustrated by 200 Photographs, Drawings, and Plans. 1912. 7s. 6d. net. [Henry Frowde, Oxford University Press.]

It is refreshing to receive, within a few months of each other, two useful books on the much neglected subject of English castles. Since, moreover, the first deals mainly with the historical side of the earlier castles, and the second treats of their architectural and archaeological aspect and carries the subject further chronologically, the one book forms a pendant to the other. The two works are therefore a welcome addition to our scanty literature about castles in general, which has hitherto been confined practically to the two volumes of the collected papers of the late Mr. G. T. Clark.

The object of Mrs. Armitage's book, as her publisher's prospectus states, is "to prove that the castles built by the Normans in England, Wales, Scotland, and Ireland were, with very few exceptions, earthworks with wooden buildings upon them; and further, that there is not the least reason to suppose that the Anglo-Saxons or any other pre-Norman race in these islands ever threw up the earthen mounts which have been so commonly assigned to them of late years. An attempt is made to show that, even on the Continent, the private castle was not universally established until the triumph of feudalism in the tenth century. A catalogue is given of the castles which can be historically traced in England to the eleventh century, and in Wales, Scotland, and Ireland to the eleventh or twelfth, with ample notes from the original, and sometimes unpublished, sources concerning them. In order to further the

very difficult study of castle architecture, lists are given of the castles which can be with certainty attributed to fixed dates, and an endeavour is made to throw light on the development of castle-building in the eleventh and twelfth centuries."

Mrs. Armitage's arguments have already appeared in print, in the *English Historical Review*, the *Antiquary*, and elsewhere, but are here presented in a revised and enlarged form. They challenge a theory put forth by Mr. G. T. Clark, that the moated mounts and appendent baileys formed by banked enclosures, which constitute the basis of a very large proportion of our earliest castles, are identical with the burhs (or fortified towns) of the Anglo-Saxon Chronicle. It is now a matter of general acceptance that Mr. Clark was wrong, but everyone knows how hard it is to dispel a theory when once it has appeared in print.

Mrs. Armitage's book is divided into twelve chapters, to which are added eighteen short appendixes and a schedule of English castles known to date from the eleventh century. The bulk is occupied by five chapters of interesting historical and descriptive notes on the castles of the Normans in England, and on what Mrs. Armitage prefers to call the "motte-castles" of North and South Wales, and of Scotland and Ireland, all illustrated by a good series of plans. The last chapter, on the "Stone Castles of the Norman Period," is somewhat unequal, and marred by several contradictions and important omissions. The book ought too to have been more efficiently indexed, but it is nevertheless a good one, and deserves special notice as being the outcome of much patient original research on the part of a lady.

Mr. Hamilton Thompson's book is, according to his preface, an attempt "to trace the growth of the general principles of medieval fortification, with special references to castles, in which, within their limited area, the most complete illustration of those principles is given. In order to give greater clearness to the account of their evolution, a prefatory chapter deals generally with earlier types of fortification in Britain, and the critical period of Saxon and Danish warfare is treated in the second chapter with some detail. This leads us to the early Norman castle of earthwork and timber; and the stone fortifications to which this gave place are introduced by a brief account of the progress of siege-craft and siege-engines. The Norman castle and its keep or great tower are then described. The developments of the later part of the twelfth century and the arrangements of the thirteenth-century castle, with those of the dwelling-house within its *enceinte*, follow and prepare the way for the castles of the reign of Edward I. which represent the highest effort of military planning. In the last two chapters is related the progress of the transition from the castle to the fortified manor-house, which followed the introduction of firearms into warfare and preceded the Renaissance period."

For the clear and logical way in which Mr. Thompson has worked out his subject, in the twelve chapters of his book, we have nothing but praise, and the architectural side has been efficiently dealt with, notwithstanding a too scanty series of plans, which should have included at least those of Chepstow, Carnarvon, and London. The subject-matter too would have gained had the author depended more upon facts than the works of Mr. G. T. Clark and M. Viollet-le-Duc. Mr. Thompson seems, moreover, to have overlooked the excellent accounts of castles in the published volumes of the Victoria County History. He would there have found a more correct plan of the singular castle of Berkhamsted than that in Mr. Clark's book which he reproduces, as well as the suggestion offered that the unfinished series of bastions encircling part of the castle formed platforms for the engines that hurled *damnosos lapides* against the great tower in the siege so graphically described by Roger of Wendover. To this and other contemporary English chroniclers Mr. Thompson might also have turned for facts about the sieges of Dover, Windsor, and Bedford castles that would probably have served his purpose as well as the imaginative speculations of the ingenious Frenchman whose drawings he has likewise borrowed.

A little investigation, moreover, would have shown Mr. Thompson that the Roman fort of *Gariannonum*, like all of its type, had a fourth wall, and that *Othona* and *Anderida* were not towns, but merely two forts of the Saxon Shore; a visit to *Othona*, too, would have shown him that Cedd's ruined church stands athwart the site of the western and not the eastern gate.

Mr. Thompson ought surely to be aware that the fortress now called the Tower of London was almost as wholly *within* the medieval, as it was originally all within the Roman city wall; and that the White (or Great) Tower could hardly have formed (p. 38) one of the Conqueror's *firmamenta* of 1067 when it was not begun to be built until twenty years later. A visit to Colchester, or even a reference to Mr. Clark's plans, would also have made it clear that the great tower there, on account of its exceptional size, had two cross-walls instead of one, and that the present entrance into the basement, like the huge vice just within it, is an early insertion.

Mr. Thompson will perhaps pardon our mentioning one or two other points.

Ludlow should also have been quoted (on p. 89) as an early example of the association of a newly planned walled town with a pre-existing castle.

The chapel in the outer ward of Windsor Castle (p. 109) was ordered to be built in 1240 by Henry III., and had already practically become collegiate before the foundation of the Order of the Garter in 1348 by Edward III., who only re-furnished it. The present St. George's Chapel was begun to the west of the older one of St.

Edward in 1477 by Edward IV. There were still earlier chapels of Norman date in both the outer and the inner wards, as well as a third chapel in the great tower.

The great tower of Guildford Castle (p. 128) has been shown by Mr. Malden to be, like that at Conisborough, a later insertion in the ring wall of the mount; and the great tower of Scarborough Castle (p. 129) stands within the inner bailey, and not athwart its wall.

The gate-house at Rockingham (p. 226) has been tampered with, and its flanking towers seem to have been lowered.

Shuttered embrasures like those at Alnwick (p. 242) existed on the tower of Stokesay, and could doubtless be found elsewhere if looked for.

With the magnificent brick tower of Tattershall (p. 352) should be mentioned the smaller and somewhat later tower, also of brick, in the bishop's palace at Buckden, which was obviously copied from it.

The castle of Pevensey (p. 360) did not belong to the mount and bailey type, but, as recent excavations have shown, had a great tower of unusual plan standing in the bailey.

These, and some other minor defects that could be pointed out, detract but little from the excellence of Mr. Thompson's work, and can be corrected in a second edition, which, owing to the general interest and value, as well as the low price (7s. 6d.) of the book, will doubtless soon be called for. The startling statement on p. 248 can then also be modified, that certain loops in Warkworth Castle were designed for a cross-bow sixteen feet long!

Mr. Thompson has given us quite an imposing bibliography of castle literature, and his book seems to be efficiently indexed, but the names of persons and places and his "*index rerum*" should have been combined. The illustrations are mostly photographic, and both admirable and well chosen, but why has not the author given a list of them?

W. H. ST. JOHN HOPE.

STRUCTURAL MECHANICS.

The Principles of Structural Mechanics, treated without the use of Higher Mathematics. By Percy J. Waldrum. 80. Lond. 1912. 7s. 6d. net. [B. T. Batsford, 94 High Holborn, W.C.]

In a treatise on the elements of any subject we do not expect anything new; thoroughness and simplicity seem to be the only things that can be aimed at. In this book on mechanics, Mr. Waldrum not only has done this, but he has brought his imagination to bear upon matter which has by this time been worn threadbare by mathematicians and other utilitarian folk.

To the majority of students the study of structural mechanics is a dry proceeding, mainly because most of the authors, while dealing with the subject adequately enough no doubt, do not present it as a thing having much humanity about it. This Mr. Waldrum has done, and we have the

old stuff put before us in a fresh, interesting, and almost literary manner. It is not what he says, but how he says it, that distinguishes this book from the many well-known and good books on the subject.

The author tells us that he has been "forced to the conclusion that the study of first principles has hitherto been treated in too brief and cursory a manner," but the student who perseveres "in the apparently tedious process of building up all his knowledge from first principles is rapidly rewarded by finding this somewhat dry subject instinct with a life and interest which is largely obscured by the more rapid mathematical treatment." He is therefore very careful in the early portions of his book to cover the ground deliberately and thoroughly. His explanation of the elementary facts of action and reaction is specially pleasing and characteristic of his method: "it should be carefully noticed that material never hits back any harder than it is hit, and if you kick a wall with a 5 lb. kick you feel no more than a 5 lb. reaction; it may be quite capable of exerting a 300 lb. reaction, but it does not do so except under a 300 lb. provocation: it hits back in very much the same manner that it is hit." Again, "it takes two to make a quarrel, and it takes two equal and opposite forces or reactions to make up what we understand as simple tension or simple compression."

We had thought that there was nothing new to be said about the theorem of the parallelogram of forces: perhaps nothing new is said in the book, but it is certainly presented in a fresh manner: the geometrical proof with which one invariably sets out is not dealt with until the student has been led through a series of experiments, by means of simple apparatus, to grasp the action of forces about a point, and instead of the funicular polygon being considered as a mere inert diagram or figure drawn out to explain some chain of reasoning—a static method of dealing with a problem of dynamics—it is regarded more as a tool or apparatus, and as such lends itself to a dynamic treatment of the problem.

The subject of moments is dealt with at considerable length: one is convinced that many students do not master the idea of moments until after they have been acquainted with the word for years, perhaps because the word "moment" as used in mechanics seems to be one of those words in our language which has an air of detachment about it in that it does not automatically fall into its place in any category of ideas.

Coming to the question of bending moments in beams and cantilevers, the identity of the balanced cantilever with the ordinary see-saw is well brought out. Of course there is nothing new in this, but the author has realised, quite rightly, that the beginner sometimes has a difficulty, owing to preconceived ideas as to gravity, in grasping the fact,

almost necessary to the proper comprehension of the action of forces on beams and cantilevers, that the whole of the operations can be reversed with the same result: indeed, it is often easier to grasp the essential point if we fix our mind more directly upon the reactions acting upwards at the bearings, than upon the load acting downwards.

The point as to the inadvisability of regarding the ends of girders as fixed is clearly brought out. This is important, as it is not obvious to a beginner why rolled steel joists bolted to steel stanchions, with, say, four $\frac{3}{4}$ -inch bolts, should not be regarded as having fixed ends. But this is a fallacy to which sufficient attention is often not given even in practical building work. This important point is again emphasised in the chapter on deflection, and in the author's remarks on continuous beams.

In dealing with the modulus of rupture we are told that this is the same whether the section is large or small; this is, of course, correct if you can be sure that your large section is as consistent as the smaller section from which you have deduced your M.R. by experiment; we are, however, inclined to think that if experiments were made upon far larger samples of materials than has hitherto been the case, it is possible that our views would be modified somewhat as to their modulus of rupture. This is a point having little or nothing to do with the use of a factor of safety.

The chapters on deflection and shear are good, the latter being treated at much greater length than is usual in an elementary handbook and is summed up as follows: "Although the deflection of a cantilever is the result of the stretching of one flange and the compression of the other, its amount is also affected by the depth which determines the initial gradient, and by the length, which determines the effect of that gradient, and also the amount of stretch." After having read Mr. Waldram's previous explanation this sentence sums up the question of deflection in a nutshell.

His way of thinking of a beam when under central concentrated load as a double cantilever that is upside down like a see-saw is used with felicity to explain vertical shearing stress.

There are four chapters on retaining walls and foundations in which the author continues his method of explaining by common-sense illustration the way in which walls are stressed by the pressure of the earth behind; and having in the earlier portions of the book explained with considerable care the theory of bending moments he is able to make clear to the student such technicalities as the angle of repose, co-efficient of friction, the reason for batter on the outer face of a retaining wall, and stepping to the inner face against the earth, and the general principle underlying the construction of those reinforced concrete walls having a broad base; &c. All this without the endless and complicated pages of formulæ which

students often find so heartbreaking, simply because he has in the earlier portions of the book taken unusual care to explain the underlying principles.

The chapter on roofs seems to be the least satisfactory, probably because so much explanation is attempted in so little space. In order thoroughly to grasp the reasoning the student would require a more detailed knowledge of graphic statics than the author gives in chapters 7, 8, and 9. For instance the somewhat complicated stress diagram for hammer-beam trusses, fig. 152, is explained in part only. This would be sure to muddle a student, who will probably have forgotten the explanation of the particular use of the link polygon, fig. 41, quite early in the book; a reference back to this figure seems essential.

The same criticism applies to many of the figures illustrating the author's remarks on arches and domes. In some cases more explanation is necessary to elucidate the figure, or at any rate cross-references to earlier figures to jog the student's memory as to points which, if not appreciated in their special connection, would prevent the student following the explanation given.

One of the best chapters in the book deals with columns. The author makes a really successful attempt to dig out the meaning of the words "radius of gyration," which it will repay any student to master. Many books merely muddle him by saying that the radius of gyration is the square root of the moment of inertia divided by the area, or something to that effect. To do this and nothing more is merely evading the question under cover of some words of important sound. One of the most popular of text-books from which we ourselves have suffered does this without previously defining "moment of inertia."

The book finishes with a chapter on shoring, which might well have been omitted, as the subject has been treated more adequately elsewhere; it seems to destroy the continuity of idea in the book.

From its somewhat colloquial method of treatment, we should imagine that this book has been compiled from a series of lectures delivered many times and amplified as occasion demanded to meet points of difficulty presented by students, rather than a cold-blooded attempt to write *de novo* on elementary mechanics.

Turning to smaller points there is a misprint in the bottom line of p. 61. In fig. 38 the figure 3 is missing from the structure diagram although referred to in the force diagram. A reference to the various equations from one part of the book to another by means of letters or numbers would be helpful. There is a mistake in grammar in the sixteenth line page 352.

The author is to be congratulated upon producing a book unique of its kind, which should be a help to all students.

W. E. VERNON CROMPTON [F].

TOWN EXTENSION.

Old Towns and New Needs: also the Town Extension Plan: being the Warburton Lectures for 1912. Delivered by Paul Waterhouse, M.A. [F.], and Raymond Unwin [F.]. 1s. net. [The University Press, Manchester.]

These lectures by Mr. Waterhouse and Mr. Raymond Unwin are thoughtful additions to the literature of Town Planning worthy of record.

Mr. Waterhouse's lecture deals with the new needs of old towns, whereas Mr. Unwin suggests economic and advantageous lines of development.

Mr. Waterhouse gives us some excellent advice as to what to do and what not to do in the alterations necessary to render an old town suited to modern requirements, and points out that as an old town cannot be recreated, what is done to add to its convenience should be remedial rather than revolutionary. Also that it is desirable to surround an old town by an open belt or girdle of cheerful and definite garden before a new outward development begins.

The lectures were delivered in Manchester, and both lecturers kept the needs and conditions of that town before them in their observations.

Mr. Raymond Unwin shows that it is not necessarily more profitable to pack the maximum number of houses upon an acre of ground, and gives a diagram illustrating how, if properly developed, a limited number of houses per acre is not only beneficial to the community but financially advantageous to both builders and landowners.

Again, he very properly impresses the necessity of thoroughly understanding the life and needs of the community before making any propositions for the extension or development of a town, and shows that a town plan, if wisely made, can assist industry and do much for the health and convenience of a community, and that it is as necessary for mental and spiritual health that men should live in beautiful surroundings as it is for their bodily health that they should dwell under sanitary conditions.

The publication of these lectures should secure for them a wider usefulness than would have been possible if limited to the auditors who were fortunate enough to attend their delivery.

DAVID BARCLAY NIVEN [F.].

THE MODERN COTTAGE.

Modern Cottage Architecture, illustrated from Works of well-known Architects. Selected and Described by Maurice B. Adams, F.R.I.B.A. 8s. 6d. Lond. 1912. Second Edition, revised and enlarged. 10s. net. [B. T. Batsford, 91 High Holborn, W.C.]

Much credit is due to Mr. Adams for his interesting work dealing with this modest theme, and it is to be hoped that the younger generation of our profession will read and thoroughly digest the many hints as to practical details which the book contains. In plain language the author advises us to be "natural" in designing our work, and to avoid the fussy details frequently adopted by the

so-called "practical man." It would be a great advantage to architecture generally if the British public would read the section on "The Economical Aspect of Artistic Building." Therein is contained a little sermon which should go far to convince every level-headed layman that even in the humblest class of cottage building it is cheaper in the long run to employ a capable architect than to place himself in the hands of the pretentious speculating builder. Possibly a cheap edition of the work would answer the purpose. The book is amply illustrated with plates representing some of the pick of modern work by well-known architects, and the selection could hardly be improved upon, except perhaps by the introduction of a few more interior views. C. E. HUTCHINSON [A.].

Forthcoming Books.

Mr. Batsford will publish in a few days *A Short Critical History of Architecture*, by Mr. H. Heathcote Statham [F.]. The work, which is profusely illustrated by photographs and drawings, gives a concise history of the development of architecture in such a manner as to render it not a mere statement of facts, but a critical commentary on the merits and weaknesses of the styles and buildings described and illustrated.

Mr. E. S. Prior [F.], Slade Professor of Fine Art in the University of Cambridge, and Mr. Arthur Gardner have completed an important work on *Medieval Figure Sculpture in England*, which will be published this month by the Cambridge University Press. The authors claim that English sculpture since the Saxon days has been a specific growth—*sui generis*—from its own stem, however much it has bent to the breezes of Continental fashion. Owing to the enormous destructions of its examples scarcely more than one per cent. of the figure sculpture of the Middle Ages has come down to us. What remains, however, is not scanty in itself and the 855 illustrations which the work contains have been selected from about three thousand photographs, while probably more than three times that number of actual objects of sculpture have at one time or another been brought to the notice of the authors.

Books Received.

Architectural Drawing and Draughtsmen. By Reginald Blomfield, A.R.A. With 103 illustrations. 8m. 4s. Lond. 1912. 10s. 6d. net. [Cassell & Co., Ltd.].
English and Welsh Cathedrals. By Thomas Dinham Atkinson. With 20 illustrations in colour by Walter Dexter, R.B.A., 20 in monotone, and 48 plans. 8s. Lond. 1912. 10s. 6d. net. [Methuen, 36 Essex Street, Strand].
Reinforced Concrete Construction. Advanced Course, with numerous fully worked examples. By M. T. Cantell, Licentiate R.I.B.A. 243 illustrations. La. 8s. Lond. 1912. 12s. 6d. net. (13s. post free in U.K.) [E. & F. N. Spon, Ltd., 57 Haymarket].
Surveying and Surveying Instruments. By G. A. T. Middleton [A.]. Third Edition, revised and enlarged. 8s. Lond. 1912. 5s. net. [Whittaker & Co., 2 White Hart Street, Paternoster Square, E.C.].
The Cheap Cottage and Small House: A Manual of Economical Building. By J. Gordon Allen [A.]. With over 100 illustrations. 2nd Edition. La. 8s. Letchworth. 1912. [Garden City Press, Ltd., Letchworth].
Altbuddhistische Kultstätten in Chinesisch-Turkistan. von Albert Grünwedel. Berlin. 1912. fol. 60 Marks. [Georg Reimer, Verlagsbuchhandlung, Berlin W. 85, Lützowstrasse 107-8].



9 CONDUIT STREET, LONDON, W., 19th October 1912.

CHRONICLE.

The Hon. Secretary R.I.B.A.

Members will regret to hear that Mr. Henry T. Hare, who has been suffering in health for some time, is considered not yet sufficiently recovered to make it prudent for him to return to London. During his absence his duties as Hon. Secretary of the Institute will be discharged by the senior Vice-President, Mr. E. Guy Dawber.

St. George's Hall, Liverpool.

The Council at their meeting on Monday the 14th inst. passed the following resolution, a copy of which has been forwarded to the Liverpool City Council:—

"The Council of the Royal Institute of British Architects has seen with regret the City of Liverpool's plans for altering the southern termination of St. George's Hall. The Council believes that alterations to such a building are only justifiable when inevitable, and trusts that in view of the widespread opposition of architects to any interference with St. George's Hall the City Council will reconsider the matter."

The Care of Ancient Monuments.

The Joint Committee of the two Houses of Parliament on the Bills now before the House of Lords relating to the preservation of ancient monuments met last Wednesday under the chairmanship of Lord Plymouth, and heard evidence from Sir Schomberg McDonnell, Mr. Reginald Blomfield, A.R.A., *President R.I.B.A.*, and Mr. C. R. Piers, F.S.A.

In answer to the chairman, Sir Schomberg McDonnell expressed the view that procedure by Order in Council was preferable to a preservation order, inasmuch as the latter did not provide for keeping up a monument or restoring it, but only prevented damage being done. He was in favour of allowing an owner to sell if he desired, provided the monument was under the care of the Commissioner of Works' Department. The new owner would have to take over the obligations of the former one. As regards ecclesiastical buildings,

plans of proposed restorations or additions should be submitted to the Advisory Board, which should get the Bishop of the diocese to move in the matter by asking him not to allow certain things to be done. He would go so far as to suggest that the Advisory Board should not only advise but, if necessary, intervene. A chief inspector of monuments should be appointed for Great Britain, with four assistants for England, four for Scotland, and two for Wales. He also suggested the desirability of giving grants in aid in respect of monuments maintained by county councils.

Mr. Reginald Blomfield said that the cathedrals of England, which were the most important national monuments in the country, had suffered much from reconstruction and restoration within the last hundred years. In his view the Advisory Board should be strengthened and its functions more clearly defined. The Royal Commission should also take observation of monuments of later date than 1700, as some of the most charming buildings in England had been erected since then. Absolute power should be given to prevent the export of buildings of historic interest to foreign countries. He questioned the suitability of the Office of Works to deal with all ancient buildings, and suggested that a civic department should be created for the purpose, and that the Advisory Board should have wider powers and a stronger representation than was proposed.

Mr. C. R. Peers, Inspector of Ancient Monuments, urged that a preliminary schedule of recognised monuments of historic interest should be prepared, to which nothing should be done without the consent of the Office of Works or the Advisory Board.

A New Exterior for Buckingham Palace.

A note in *The Times* of the 11th inst. states that for some time past the Executive Committee of the Queen Victoria Memorial have had under consideration the advisability of improving the front of Buckingham Palace, in order to bring it into harmony with its new surroundings. Sir Aston Webb, C.B., R.A., was invited to submit plans with this object in view, and these plans have now been approved by the Executive Committee, which consists of Lord Esher, Lord Plymouth, Lord Redesdale, Sir John Stirling-Maxwell, and Lord Beauchamp, First Commissioner of Works. The policy of the Committee has been to complete one section of the whole Memorial at a time, and it is for this reason that the improvement of the exterior of Buckingham Palace has been delayed. Sir Aston Webb's designs for the Admiralty Arch, the Mall, and the Memorial in front of the Palace were chosen from the designs submitted by five invited architects. The Committee therefore considered it desirable that Sir Aston Webb should be asked to prepare plans for the last stage of the complete scheme—the improvement of the face of the Palace. A frontage of classical design made of

Portland stone will take the place of the present exterior. No alteration of the interior of the building is contemplated, but it is obvious that the work cannot be undertaken while their Majesties are in residence at the Palace. Nothing will be done therefore until next summer, but the work will then be pushed forward as quickly as possible, in order that it may be finished before the King returns to town in the late autumn. The cost of the scheme is estimated at about £60,000, and will be defrayed out of the funds of the Memorial Committee. The rebuilding will be in the hands of Messrs. Leslie and Co.

City Traffic and St. Vedast's Church.

A few weeks ago *The Times* published a plan of the region surrounding the western end of Cheapside, showing the line of the new thoroughfare to be made in connection with the proposed St. Paul's Bridge, and pointed out the inevitable effect that this new thoroughfare must have in enhancing the already well-nigh intolerable congestion of the traffic passing north, south, east, and west along Newgate-Street, Cheapside, St. Martin's-le-Grand, and the eastern end of St. Paul's Churchyard.

Mr. Arthur Crow [F.], and later Mr. W. H. Seth-Smith [F.], had already pointed out in *The Times* that a new thoroughfare must sooner or later be constructed running from the end of Newgate Street, as directly as may be, to London Wall, Liverpool Street, and Bishopsgate. *The Times* in a leading article last week recurs to the subject and says:—

Here then emerges the question to which our correspondents have called attention none too soon. It may not become an immediately practical question for some years to come, but it is rendered an immediately urgent one by the fact that the old Post Office in St. Martin's-le-Grand is now in process of demolition, and that a new Telephone Department is to be erected on its site, occupying not merely the whole of the area thus vacated but some extension of it over the existing open space to the southward. This, in our judgment, would be a fatal and irreparable blunder. The new building, if extended on the southern side of the old, and, indeed, if not appreciably curtailed in that direction, will make it impossible to construct any new thoroughfare towards Liverpool Street without compelling all the traffic passing from Newgate Street to the new thoroughfare, or *vice versa*, to round an extremely awkward corner at the southern end of the new Telephone building and to pass through a bottleneck between that building and the houses which stand between Newgate Street and Paternoster Row. Moreover, even that awkward turn could hardly be made at all unless St. Vedast's Church in Foster Lane, a beautiful example of Wren's work, were demolished. That consideration alone should give pause to the several Government Departments and other authorities concerned before their sanction is given to the plans for the new Telephone building. But it is also backed by the further consideration that even if St. Vedast's Church were demolished—surely an act of gratuitous vandalism—nothing but a bad and bungling job could be made of the business of facilitating the traffic between Newgate Street and the new thoroughfare.

The thing is so obvious that we need expend no argument in insisting on it. Even if St. Vedast's Church were not in question at all, it would still be desirable, if not absolutely necessary, so far to curtail the new Telephone building at its southern extremity as to allow the construction of the proposed thoroughfare on its natural and proper alignment.

The writer urges that both the new Telephone building and the new thoroughfare being imperative, it is the manifest duty of all the authorities concerned to see that one of these necessities is not allowed by any default, neglect, or lack of due consideration and consultation on their part to interfere with the other, and concludes:

On all these grounds we would urge again that the question must not be prejudged by the further prosecution of the existing plans for the new Telephone Department unless and until all the authorities concerned, and all who are entitled to a *locus standi* in the matter, have had full opportunity of conferring together and considering it in all its bearings. Among those entitled to a *locus standi* in the matter we include, of course, architects of eminence and repute. That is the important principle which was recognised and established in the case of the St. Paul's Bridge, and it certainly ought to be applied in this case also.

International Building Exhibition, Leipzig, 1913.

An International Building Exhibition, with Special Supplementary Exhibitions, is to be held in Leipzig next year from May to October under the patronage of the King of Saxony and the hon. presidency of the Chancellor of the German Empire and of the Ministers of State of Saxony. This will be the first International Exhibition ever held entirely devoted to building, and its primary object is to demonstrate the progress made in the art during the last twenty or thirty years. It is desired that dwelling-houses, their plan and internal arrangements, furniture and decoration, shall be a special feature of the Exhibition. The area appropriated to the site is about ninety-nine acres, which will be extended if necessary. The exhibits will be divided into sections as follows:—

- I. Architecture. Eight Groups, with thirty-three sub-sections.
- II. The Literature of Architecture and Building; Technical Educational Institutions; Office Requisites for Architects and Engineers. Three Groups.
- III. Building Materials, their Manufacture or Preparation and Use. Twenty Groups, with twenty-four sub-sections.
- IV. Machines, Tools, and Apparatus used in Building. Five Groups, with two sub-sections.
- V. Sale and Purchase of Building Land; Building Finance; Estate Agencies; Insurances in Connection with Dwelling-houses; Book-keeping for Builders and Architects. Five Groups.
- VI. Building Sanitation for Dwellings, Factories, and Streets; Protection of Workers from Injury, with First Aid and other Provisions for their Health and Comfort; Precautions against Fire; Old Age and Invalid Insurance. Six Groups.
- VII. Gymnastics, Games, and Sports.
- VIII. Testing of Building Materials; Technical Demonstrations.

The Special Supplementary Exhibitions will accommodate various subsidiary branches of Architecture and Building, such as Lighting, Glass, Frescoed Halls and Dwelling-rooms, Tapestryed Rooms, etc. A detailed prospectus and various papers relating to the Exhibition may be seen at the Institute. The offices of the Directorate are at Windmühlenweg No. 1, Leipzig.

Lectures on Timber, for Architects.

The attention of architectural students is called to the special course of lectures and demonstrations on Timber, for Engineers and Architects, now in course of delivery by Professor Groom in the Department of Botany at the Imperial College of Science and Technology, S. Kensington. The lectures in Part (a) of the subject (delivered Tuesdays and Thursdays, 2 P.M. to 3 P.M., beginning 8th October 1912) deal with the structure, identification, and physical properties (strength, elasticity, weight, colour, durability, &c.) of timbers commonly used for engineering purposes (in houses, in mines, on railways, for paving blocks, &c.) in Europe; the structural characters determining the qualities of these; defects in timber—their identification and their effects on the various physical properties of wood; methods of improving the qualities of various timbers (including "impregnation," &c.). The lectures in Part (b), on the Structure, Defects, and Diseases of Timber (delivered on Tuesdays and Thursdays, 2 P.M. to 3 P.M., beginning 12th November, and ending 12th December 1912), will deal with the anatomy and histology of wood; the critical identification and characters of various kinds of timbers; defects in dead wood and diseases of living trees caused by various fungi—their diagnosis, ætiology, prevention, and cure; defects due to insects, to physical agencies (such as insulation, frost, drought, wind, lightning, &c.), to chemical substances (in smoke), and other causes. The prospectus intimates that it is desirable that those who attend this course should also have attended the preceding course (Timber, for Engineering Students).

The New Delhi.

The question of the choice of an architectural style for the new capital of India has been the subject of an interesting correspondence in *The Times* and other papers, and some useful suggestions have been put forward—notably by Mr. Herbert Baker [F.], Lord Curzon [Hon. F.], and Mr. T. G. Jackson, R.A. Mr. Herbert Baker favours the idea of the Classic style of Jones and Wren and their followers in the eighteenth century, as being easily adaptable to the needs of a tropical climate. Without losing its more "eternal" qualities and finer national characteristics, this style he considers should gain in freedom and power of expression by adaptation and expansion to the needs of a more southern climate.

It may be asked (says Mr. Baker) whether the employment of such a style rules out any of the nobler features of Indian architecture. The colonnade and arcade—two or three deep, if need be—the open court of audience, are common features in southern classical architecture. The deep portal arch of Persia and India has its prototype in the classical exedra common in the Roman bath and well known in the Vatican. The pride of Indian architecture, the dome, has its highest manifestation in St. Paul's. And the magnificent ground-planning of the Taj Mahal is but an Eastern example of the "grand manner" of the West.

There should exist, therefore, in the style which has been advocated, all the necessary elements ready to the hand of the architectural alchemist. But to the artist's creative power must be added sanity of judgment. He must avoid a Whitehall on the one hand, and a Palace of Delight which might come perilously near a "White City" on the other. His architecture must have the spirit of life and of growth, so that it may take root in the country and not prove sterile and unproductive in the generations to come. There must be no conscious straining after invention or originality, to which sincerity in following the true and natural laws alone can give birth. There must be good building and a frank acceptance of modern methods and materials. The controlling mind must heat and weld into his orderly conception all that India has to give him of subtlety and industry in craftsmanship. And, lastly, he must so fire the imaginations of the painters, sculptors, and craftsmen of the Empire that they may, interfusing their arts with his, together raise a permanent record of the "history, learning, and romance" of India.

Lord Curzon thinks that some form of the Classic style is well-nigh inevitable. The form of this style, he says, which has been most widely adopted by the English in India, and of which the best extant examples are to be found at Calcutta and Madras, is that which was simultaneously planted by English colonists in America and the East. It may be described as a colonial adaptation of the Palladian style.

The same style in less pretentious forms (continues Lord Curzon) was adopted by the merchant princes and magnates of Calcutta, and procured for it the somewhat ambitious title of the City of Palaces. The main ground of its suitability to Eastern conditions of life is that it admits of large and lofty rooms, with ample window space, and that the dwelling apartments can be shielded from the heat and glare of the sun by broad verandahs and colonnades. . . .

I am far from contending that this style should be reproduced in its severe and sometimes inartistic simplicity at Delhi. Perhaps it may be feasible to adopt there some richer and more imaginative variant of the classical conception. If we follow the latter style from its reappearance in Europe at the Renaissance down to the eighteenth century, we shall see that wherever it sprang afresh it took on some features peculiar to the country of its adoption. Historic conditions, the conditions of climate, the standards of life, stamped upon it a different character. But of all these forms, that which seems to be richest in possible suggestion for the East, because it was largely affected by Oriental ideas, was the Renaissance architecture of Spain, some of the most exquisite features of which are a visible legacy from the Moors. There are palaces and town halls and public buildings erected in this style in Spain, which the traveller seldom

sees, but which are among the most beautiful structures in Europe.

Possibly the selected architect of the new Delhi, if he makes some such choice, may find in the country itself, in the models which he sees around him, in the spirit of the East, or in the talents of native craftsmen, something which will give a similar Indian flavour, a native *aura*, to the forms of the West.

Mr. T. G. Jackson, who deprecates the selection of any definite architectural style, says :

This is not the way in which to get the best architecture. Our best artistic suggestions for design come from necessities of construction and considerations of utility. *Nunquam vera species ab utilitate dividitur.*

To seize on these suggestions and draw inspiration from them is the true path for the architect to follow; to be able to meet them and satisfy them successfully is the proper end of all architectural study. We should study works of art, not to copy them, but to be impregnated with their principles; and if our study has done its work we should be so saturated with the true principles, not of this or that particular style, but that of architecture itself, which is a very different matter, as to be ready for any novel conditions that may present themselves.

Such conditions no doubt do present themselves at Delhi, and there could be no more splendid opportunity for a sensible development of architecture. The first considerations should be purely utilitarian: what sort of construction is demanded by the climate, the social habits of the inmates, and the functions the buildings are to fulfil. To think first of the style, and try to bend and warp an old one to suit the case, is to begin at the wrong end, and will only ensure another of the many disastrous architectural failures of which India has been the field. The very difficulties that present themselves in the way of using a ready-made style should be regarded as the most fruitful source of inspiration for good design. As the conditions are novel, so to the same extent no doubt will be the result. The utilitarian problem must be faced boldly and come before everything else. Whether the forms that best solve it conform to any existing style or not is of quite secondary consequence. That they should to a certain extent regard precedent is, of course, inevitable; we cannot forget the past, but they must not be fettered by any conventional formula. Whether they will be beautiful or not will depend solely on whether the architect is a true artist or merely an engineer. For the artist only differs from other men in this—that he does gracefully and beautifully the same things that the inartistic man would do, usefully perhaps, but unattractively.

British School at Rome : Scholarship in Architecture.

Candidates who are eligible to compete in the open qualifying examination for the Scholarship in Architecture at the British School at Rome offered by the Commissioners for the Exhibition of 1851, full particulars of which were published in the JOURNAL R.I.B.A. of the 31st August last, must apply in writing to the Hon. General Secretary, British School at Rome, 54 Victoria Street, London, S.W., for particulars of the subject set for the examination, on or before the 31st October. The subject will be forwarded by post on the 5th November to intending candidates, who must be careful to write distinctly in their applications their full names and addresses.

OBITUARY.

The late William Frederick Unsworth.

Mr. W. F. Unsworth, of Petersfield, died quite suddenly at his residence at Steep, near Petersfield, on the 6th inst., at the age of sixty-one. He was apparently in good health on the previous Friday, when I had the privilege of taking breakfast with him at the Arts Club, and seemed quite well on Saturday morning, but was seized with heart failure in the evening and passed away the same night.

William Frederick Unsworth was articled in 1869 to Messrs. Wilson & Wilcox, of Bath, and after a year's travel in France was for two years in the office of the late George Edmund Street, and for a year with the late William Burges. He started practice in London in the year 1875, and scored his first success in the competition for the Shakespeare Memorial Theatre and Library at Stratford-on-Avon, which he was commissioned to carry out. The design of this building shows a strong feeling towards French Gothic, and it may be allowed that this feeling was in great measure due to the influences which still dominated one who had worked in the office of William Burges. But Unsworth's sympathies, judging from his later work, were more in accord with the best traditions of English Medievalism, and it was this spirit that influenced him in his later productions.

Unsworth brought to the execution of his work an enthusiasm that occasionally was almost feverish in its intensity, and a knowledge of style that gave distinction to all his buildings, whether domestic or ecclesiastical. His detail was especially interesting and charming. He had made a profound study of the best examples of the work of the past, and was particularly happy in the adaptation of old work to modern requirements. His designs for wrought-iron work, which were peculiarly pleasing, take high rank in this class of work. He was, too, among the earliest of the rapidly increasing number of architects who have given attention to garden planning. His own garden at Steep, merely an ordinary cottage garden when he first took up his residence there, became soon transformed in accordance with his ideas of what a country garden ought to be. He had the knowledge and the artistic ability to take advantage of what to most would have been considered insurmountable difficulties, and produced a small but perfect specimen of an old English garden. "A formal garden"—I can imagine him saying—"yes, but don't forget that flowers are for the garden, and should be the first consideration."

Unsworth was of a delicate constitution, and was always longing for the sun, and railing at our rain and fogs. Had he been more robust, it was in his nature to have felt and seen beauty even in rain and fogs. But he was for the sun, and this feeling took him to Algeria in the winter of 1910, and again to

that country last winter. With his usual enthusiasm he devoted his time while there to the study of gardens, making careful drawings and sketches of many of the old gardens along the coast of North Africa, the south of Spain, and Tangier. These, I am in a position to say, will not be wasted endeavour, as there is a probability of their appearing very shortly in book form. I have had the advantage of reading a few chapters and of seeing some of the sketches, and have formed the opinion that the book will be of the greatest interest and a valuable addition to garden literature.

Among Unsworth's architectural works I should like to mention, as well worth a visit, a small brick-fronted warehouse, built in 1883, which is quite hidden away in Star Yard, at the back of Chancery Lane. Other notable works are his restoration of St. Mary's Church, Horsell, Surrey; Christ Church, Woking, and subsequent enlargement; church at Woodham, Surrey; chapel of the King's School, Warwick; Rossall School Chapel; Sion House, Strabane; houses at Harrogate and Burnham; additions to Selsdon Park, Sandstead, etc. He was formerly in partnership with Mr. Dodgshun, in Old Queen Street, Westminster; then practised alone in Old Palace Yard, Westminster, and latterly, in conjunction with his son and Mr. Inigo Triggs, at Petersfield. He was elected an Associate of the Institute in 1882, and proceeded to the Fellowship in 1891.

T. E. COLLCUTT [F.]

Francis Edward Masey, of Salisbury, Rhodesia, whose death occurred in that city on the 3rd September from pneumonia, at the age of fifty-one, was elected Fellow of the Institute in 1901. His connection with the Institute dates back to 1887, when he won the Soane Medallion and £50 with a design for City Police Courts and Police Station. In the following year he was awarded a Medal in the Tite Prize competition, and in 1889 and 1891 Medals in the Owen Jones Studentship competition. Mr. Masey was the third son of the late Philip E. Masey, architect, of London. He served his pupilage in the office of his father, and in 1878 entered the office of the late Alfred Waterhouse, R.A., with whom he remained till 1896. He became a student of the Royal Academy in 1887, and during 1889 and 1890 spent some time travelling in Italy and France. In 1896 he joined Mr. Herbert Baker [F.] in partnership in Cape Town, and was jointly responsible with him for some of the most important buildings in South Africa. These include, in Cape Town, the Cathedral, the Rhodes Memorial, the City Club, buildings for the De Beers Company, Churches of St. Barnabas, St. Michael, St. Philip, &c. Works in other parts of the country included the Mafeking church, the Shangani Memorial to Major Wilson, the Kimberley Siege Memorial, buildings of the Diocesan and South African Colleges, and Dale College, King Williamstown.

The domestic work of the firm is known all over South Africa, and includes houses for Cecil Rhodes, S. Marks, P. A. M. Cloete, Carl Jeppe, and J. J. Bissett. Recently Mr. Masey started an independent practice in Rhodesia: the Salisbury Club, the Board of Executors, the new St. John's Church at Bulawayo and the Bulawayo Museum are examples of his work there. He was an enthusiastic antiquary, contributor to various journals, founder of the South African National Society for the Preservation of Objects of Historic Interest, and filled for some time the Chair of Architecture at the South African College. He was largely instrumental in the formation of the Cape Institute of Architects, and was first President. Mr. Masey enjoyed the affectionate regard of a large circle of friends here and in South Africa. His talents as an artist were widely recognised, and his untimely death in the zenith of his powers is deeply mourned. The local newspapers report that a large gathering, fully representative of the community, assembled in the Pro-Cathedral on the occasion of the funeral. The officiating clergy were the Bishop of Mashonaland, the Dean of Salisbury, and the Rev. E. J. Parker, the final office at the interment being read by the Bishop.

CORRESPONDENCE.

Architects from George IV. to George V.

September 1912.

To the Editor, JOURNAL R.I.B.A.,—

SIR,—Mr. Maurice B. Adams' Paper, under the above title, read before the Glasgow Institute finds a worthy place in the JOURNAL. It is good that those who have made their mark in the profession should not be forgotten, particularly when men like Mr. Adams can speak of many of them from personal acquaintance. The Paper is, I venture to say, well and entertainingly written, and I have thoroughly enjoyed its perusal. Many thoughts, in reminiscence, arose in my mind during the reading, and I should like to be permitted to put them down as a sort of Addendum to the Paper.

Mr. Adams speaks of Sir John Soane (p. 601) as the "Master of commonplace Greek," but I believe most of us will agree that the Bank of England, and the Treasury in Whitehall, should have saved Sir John from such a criticism. Mr. Adams refers, rightly, to Sir John Soane (p. 602) as being the architect of "Holy Trinity, Marylebone," and a little lower down on the same page he mentions "Marylebone Church" as if the two churches were the same. St. Marylebone Church, opposite York Gate, was built by Thomas Hardwick—and a previous design for the same church had been made by Sir William Chambers.

Sir Charles Barry's early taste for redundant ornament "reasserted itself" (Mr. Adams says) "in his Gothic work." During the war between

the respective sons of the two great architects of the Houses of Parliament I remember I was told to go and look at Barry's Gothic church off the Farringdon Road and ask myself the question whether the man who built that could possibly have designed the Gothic work of the Houses of Parliament. I did look at the church, and I formed an opinion which shall remain in that jewelled casket the key of which is in my possession only.

Curiously enough, Mr. Adams omits to mention (except in a line on p. 644), in speaking of Sir James Pennethorne's work (p. 602), that remarkably fine building of Pennethorne's, the University of London in Burlington Gardens, with its fine sculptural groups; and he also omits reference to the Public Record Office in Fetter Lane (except in the Appendix, p. 647). I remember a little episode which occurred *re* the building in Burlington Gardens. Pennethorne's first design was Venetian Gothic—but the Government would not have it, and it was changed to the present more Classic work. The Gothic building had got up some distance above the ground before the work was stopped, and when the foundations for the new design were being excavated a considerable quantity of the masonry for the Gothic structure was discovered buried neatly away. The masons had made mistakes in the work, but little thought that their blunders would be brought to light in their own lifetime.

Mr. Adams mentions (on p. 602) various cements in use at the dates set forth, but he omits "Medina cement," which was, I think, in vogue about those times, and which I have myself used.

The mention of P. Hardwick (p. 604) reminds me of another little episode—it may, however, only be a story. Hardwick prepared a design for the present Drummonds' Bank at Charing Cross, and it is said that Drummonds told Hardwick that they expected his personal and careful attention to the work. Hardwick said that he would give that work no more, and no less, of his personal attention than he gave to any other of his works; the result being that a high-class firm of builders was substituted for Hardwick, and when the work was completed the outcry was such that the upper part was altered as we now see it.

The mention of Scott and Grimthorpe recalls to my memory the delight I took in the controversies over St. Albans—how Scott was "chucked" by Grimthorpe, how Grimthorpe and his able clerk of works will be handed down to a remote posterity by the splendid building work of Longmire & Burge; how Canon Venables "went for" Grimthorpe in *The Times*, and how the future noble Lord pounded Venables by his ruthlessly unpolished rejoinders; how Grimthorpe deceived a certain Archæological Society, how that Society retaliated by spiteful reference to the "Jubilee Coin" tracery in the new north transept; how Grimthorpe "chucked" the R.I.B.A. because

they ridiculed the "arched cill" of his great western window; and how he ever after referred to the said R.I.B.A. as "The Trade Union Society of No. 9 Conduit Street."

Mr. Adams, in referring to the Architectural Museum (p. 606), reminds me of a lecture by Wm. Burges at Tufton Street. In speaking of a certain piece of tile paving he remarked: "I don't know who made the design, and I don't care, but it is a d—d bad one." Another amusing thought arises on Mr. Adams' reference to the Society of Architects (p. 606). Many years ago, when Seth Smith was its President, I accompanied the Society on their visit to Belgium, when King Leopold had consented to receive the Society at his Palace at Ostend. The steamer was late, and we had to put ourselves into "plated harness" (otherwise "evening dress") in the afternoon. The day was wet and muddy; the accommodation provided for the forty or so members, and the wives of some of them, at certain houses on the quay was limited, and—and—but I must leave Mr. G. A. Middleton to complete the story, as he was our "introducer" to His Majesty.

The mention of the name of J. L. Pearson (p. 607) reminds me of his beautiful work at the Houses of Parliament towards Parliament Square at the side of Westminster Hall, and of that Gothic gem on the Victoria Embankment near the Temple for the offices of Mr. Astor. Pearson's trouble at Peterborough Cathedral should have quieted the Society for the Preservation of Ancient Monuments for about a century. As to the work of Raphael Brandon, what a pity it is that his Irvingite Church in Gordon Square is still without the tower and spire which he designed for it!

I remember so well the delightful little conversation I had with James Brooks (p. 607). The Liverpool Cathedral competition, in which Brooks took part, and his chagrin at the whole business, loom up before me in unpleasant recollections, as does the more recent Liverpool Cathedral competition in which I was weak enough to take part.

The reference to William Burges' house (p. 643) reminds me of the visit I paid to it and of the beautiful mediæval illuminations and artistic work therein displayed; and I agree with Mr. Adams that Lord Leighton's house is not so interesting as that of Wm. Burges. I shall always remember my visit to Lord Leighton's house because when I entered the "Court" I was struck by the beauty of a picture opposite me, and, in approaching nearer, I went splash into the gold-fish pond, which I had not noticed was between me and the picture. I was the more annoyed at this as a certain gentleman with whom I was at the time at war (in the *Building News*) was looking on at my discomfort.

In speaking of Burges' design for the Law Courts (p. 643) Mr. Adams omits to mention that most beautiful detail of a portion of the Strand front (French Gothic)—the detail drawing of which was, I think, made by Mr. Phené Spiers.

E. W. Godwin (p. 643) I remember by his contemplation of the decorations of a ceiling at a certain house at Chelsea, viewed, lying on his back, with some friends, male and female, in a like position, in order to judge the effect from that which he said was the right position.

The reference to George Edmund Street's works on p. 643, amongst them his church of SS. Philip and James, Oxford, reminds me of the inclination of the south wall of the chancel of that church eastwards, to represent, symbolically, the inclination of our Saviour's head on the Cross. I remember, too, the finely carved caps of the nave columns of that church, which I had the pleasure of sketching.

In mentioning the names of some of the most able architects of their day (p. 643) Mr. Adams refers to Wm. White, and well I remember that when he and another departed architect, Mr. Dawson, got on their respective legs at the Institute there was little chance for anyone else during the evening. S. S. Teulon always connects himself in my mind with "Luton" bricks, and his fine church of St. Stephen's at Hampstead shows the value of their use. John P. Seddon's kindly presence I also recollect, and I owe him thanks for supporting my idea of a "podium" at St. Martin's Church.

A glance at the long list of names in Mr. Adams' "Appendix" to his Paper shows the very great pains he has taken to complete his little history, and he and I are, fortunately or unfortunately as the case may be, old enough to have seen and heard many of the men, great in their respective ways, mentioned. The Pennethornes, James and John, the latter the discoverer of the Greek architect's respect for optical illusion, as shown in the Parthenon; James Fergusson, E. B. Lamb, the designer of that most original and beautiful church of St. Martin, Gospel Oak; Owen Jones; Edmund Sharpe; S. S. Teulon; Ewan Christian, and his amusing references to certain parts of St. Mark's at Venice; Lord Grimthorpe; George Godwin; F. C. Penrose; John Ruskin; Beresford Hope; Wyatt Papworth; Professor Kerr, and his real good oratory at the Institute; George Aitchison, full of artistic attributes, and a "District Surveyor" at the same time; Arthur Cates; Sir Arthur Blomfield; F. P. Cockerell, and many others, stand before me recalled to memory by Mr. Adams' Paper.

Of the Past Presidents whose portraits adorn our walls, not to mention those still, happily, surviving within our ranks, I can call to mind with pleasure Sir Gilbert Scott, Charles Barry, John Whichcord, George Street, Sir Horace Jones, Ewan Christian, Edward Pauson, Alfred Waterhouse, Francis Penrose, and George Aitchison.

I must now bring this little "Addendum" to a close or I shall be "crowded out" of the JOURNAL, and I conclude by the fervent hope that there will be another Maurice B. Adams to write an equally good Paper on the Architects from George V. to WM. WOODWARD [F.].

